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HOME GYMNASTICS

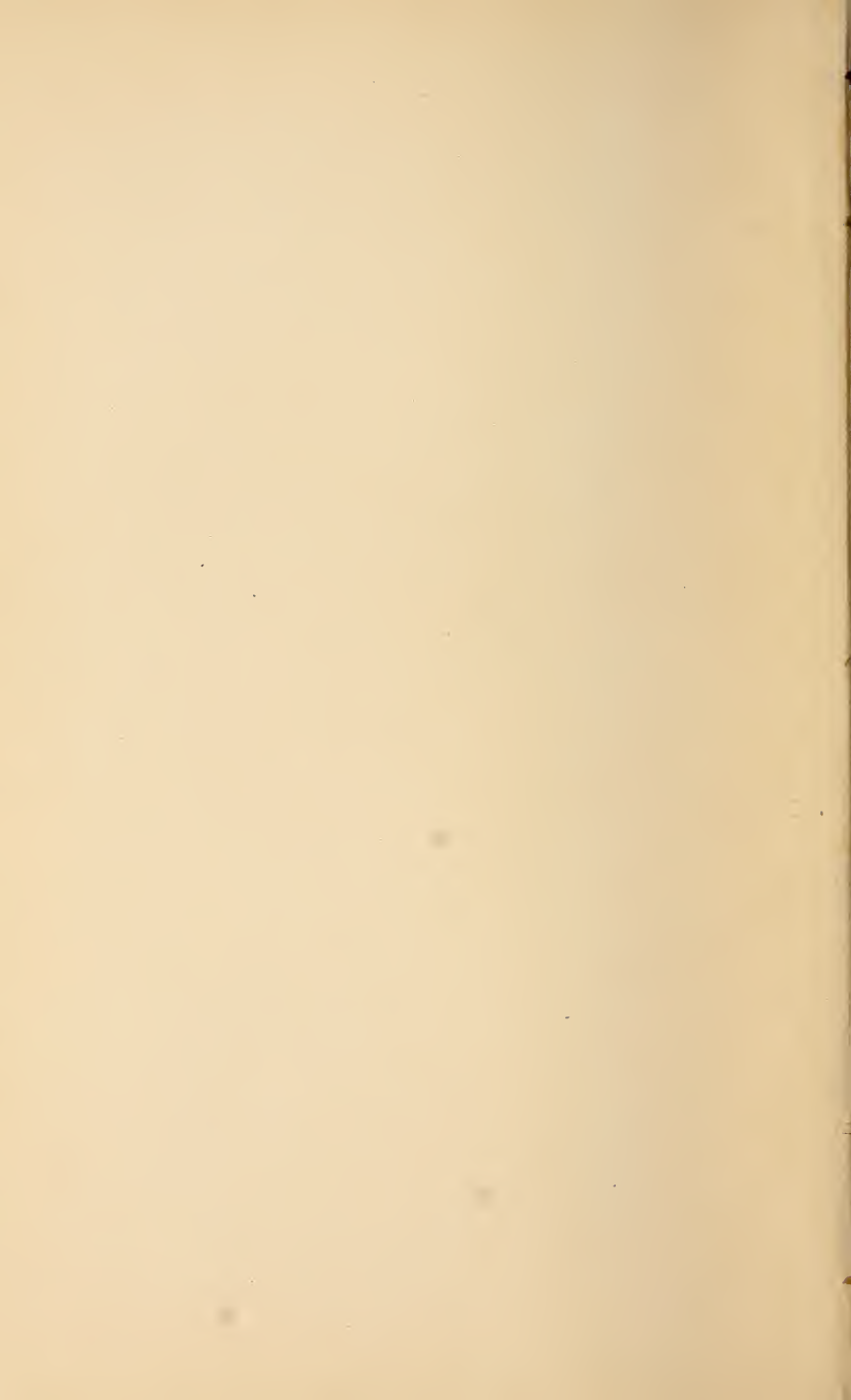


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HOME GYMNASTICS

FOR

THE PRESERVATION AND RESTORATION OF HEALTH
IN CHILDREN AND YOUNG AND OLD
PEOPLE OF BOTH SEXES.

WITH A SHORT METHOD OF ACQUIRING THE

ART OF SWIMMING.

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Translated and Adapted from the Swedish Original by Special
Permission of the Author

BY
C. LÖFVING.

WITH THIRTY-ONE ILLUSTRATIONS.



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PREFACE.

MORE than half-a-century has elapsed since Ling gave the world his ingenious system of gymnastics, calculated to produce a harmonious development of the human organism, and to ensure the preservation of health, as well as the cure of diseases.

The whole system—educational, as well as medical, gymnastics (“Kinesipathy”)—has, on the Continent, acquired the name *rational* gymnastics, on account of its being based on truly scientific principles, Ling never using a movement of which he could not scientifically demonstrate the physiological effects.

This it is which surely, though slowly, has made his discoveries, in the relations of movements to the biological phenomena, one of the chief factors of the prophylactic (*i.e.*, disease-preventing) tendency that the medical art in our days is adopting, and one of those

that will essentially contribute to gain for it a place among the so-called *exact* sciences. For the healing art becomes less empirical in proportion as it can, by reasoning, ascertain beforehand which are the physiological effects of a remedy, and the more its practice is based on purely physiological means. It is dawning more and more upon the mind of physiologists and practitioners that "motion is the principal agent in the whole process of life," and that systematic muscular exercise is one of the best means for influencing the vital actions of the body.

Ling himself (having his time taken up with the practical carrying out of his work) did not write much on the subject; but he formed disciples, not only among his own countrymen, but also among people of other nationalities, especially Germans,* which disciples carried out the master's work, and some of whom have, moreover, written excellent expositions of the system.

* The Royal Gymnastic Central Institute in Stockholm, with the generosity characteristic of all the State Institutions in Sweden, is open gratuitously to ladies and gentlemen of all nations, who are able to fulfil the same conditions as the Swedish candidates.

Of Swedish authors on this subject, no one has done more to popularize it by writing than the author of this little book—a physician who is at the head of the department of medical gymnastics at the Royal Central Institute of Stockholm.

This book is not intended as a guide for the teaching of gymnastics in schools, but it contains a selection of “active” movements, of great hygienic value, for the use of every one.

It is essentially a book for *every home*.

The learned Professor expresses himself in such plain and homely language that it can be understood by all, even by the comparatively ignorant.

As a proof of its popularity, it may serve to mention that the first edition of the original work was disposed of in Sweden within two months.

If people at large gain some more accurate knowledge of the laws that govern their nature, and become familiar with the use of rational hygienic movements, this will not only provide them with a good means for preserving themselves in health, but also

exercise a great moral influence, in providing them with one ready means of counteracting vicious tendencies.

Let me give an instance. That morbid state of the sympathetic nerve, generally manifesting itself by an uneasy sensation in the pit of the stomach, and which is, in many cases, the direct physical cause of vice (creating in one person a craving for drink, in another a craving for tobacco or opium, or other unwholesome things), can be removed by movements calculated to restore the perverted nerve-action to its normal state.

Then there should be mentioned, with due weight, the great value of systematic movements as an after-treatment for persons weakened by severe disease. The physician prescribes a generous diet for such a person ; but what if the structures of his body are not in a fit state to absorb and assimilate the nourishment administered ? Appropriate movements are one of the most natural and sure means for re-establishing the balance in the whole process of nutrition in the body. Persons in such a weakened condition are therefore strongly advised to practise suitable exercises, and they, as well as others, will find a safe guide in this little book.

As to the plan of its arrangement, the Author, after some introductory remarks, gives a few short and clear indications as to the influence of movements on the various vital functions in the body (Chapter I). In Chapter II follow some general hints on the principles to be observed in performing movements. Chapter III contains descriptions of the various forms and special effects of the movements selected for this book out of the many that this system has developed. Chapter IV contains prescriptions of movements for special cases, and, finally, a short treatise on cold baths and swimming.

To some people the means here presented may seem too simple: like Naaman the Syrian, who despised the prophet's advice to bathe in the river Jordan; but we would advise them to follow his example, and, nevertheless, try the simple means, and also persevere in its use.

May this little book gain an entrance into English and American homes, as it so well deserves to do; may its right use add to the health and happiness of thousands of individuals, from the humble dwelling of

the artisan to the palace of the rich ; and thus may it help to diminish the great amount of suffering we daily witness in the world !

C. LOFVING.

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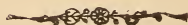
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INTRODUCTION.

EVERYONE admits that it is wiser and better to prevent an evil, while it is in one's power to do so, than to remedy it afterwards. It is better to avert disease by appropriate means than first induce it and then attempt to cure it. Even if, for the preservation of health, some sacrifice of habits and tastes should be found necessary, surely this would not be too high a price for the undisturbed enjoyment of a blessing, the absence of which diminishes the value of all other good things in life !

It is a generally known and recognized rule for the preservation of health that one should "take a walk" every day. This is, no doubt, beneficial to health. Still, experience shows us that walking is not the infallible and all-sufficient means it is supposed to be ; for a great many most eager and conscientious walkers are both weak and ailing, and become worse and worse in spite of their walks. By this we do not mean to say that the walking is the cause of their debility and sickness, but that this form of exercise does not fulfil *all* the conditions required for exercise aiming at the prevention or cure of disease.

To serve this purpose the exercises used must be

estimated and defined beforehand as to their energy, extent, and physiological effects, and chosen accordingly. But in ordinary walking, or in riding, driving, rowing, &c., the effects are more or less one-sided and vague. The same defect also is to be found in most forms of labour belonging to the different trades and professions, though of course varying according as these vary. For there is this essential difference between hygienic gymnastic movements and those occurring in actual labour, that the former, having as their sole aim the promotion of a normal development and action in the human individual, both the position from which the movement starts and the manner in which it is performed are entirely calculated to subserve this aim, whereas ordinary labour exacts such attitudes and movements as will best suit the work, even if these should happen to be ever so much inimical to health. The consequence of this is that the more or less *one-sided* action belonging to most forms of daily occupation, in the long run disturbs the harmony of the body, so that even working-men often are greatly in need of systematic gymnastic exercises to counteract the one-sided influence to which their frame has been subjected in their occupation; how much more, then, persons leading a sedentary life, and having essentially mental occupations?

It is in great measure the possibility of localizing and determining the effects of the movements—first scientifically and systematically demonstrated by Ling—which has assigned to gymnastic exercises the importance they

have gained in these later years for dietetic and curative, not less than for educational purposes. For we are thus enabled to secure beforehand, not only the restoration to normal strength of enfeebled parts, but also to ensure that every set of muscles gets its due share of exercise, so as to bring forth an *all-sided* and harmonious development.

But in order to make them a real health-preserving and health-restoring means, the gymnastic exercises must be performed every day or even several times a day. To many persons it may be very inconvenient as regards time and cost, &c., to frequent a Medico-Gymnastic establishment.*

During the many years that I have been at the head of the Medico-Gymnastic Department of the Royal Central Institute it has been customary to give the patients *prescriptions* containing so-called "home exercises," and this either whilst the treatment was being carried on at the Institute, or at its conclusion, thus inducing the patients, and making it easy for them to continue taking gymnastic exercises daily, not for a few months or years only, but during their whole life.

Now the purpose of this little book is to call the

* If this be true in Sweden, where in nearly all towns of importance there are one or several such establishments, conducted by ladies or gentlemen who have qualified themselves at the Royal Gymnastic Central Institute for obtaining diplomas authorizing them to establish themselves as Kinesiotherapeutic practitioners, how much more then in England, where there is no public institution where the subject may be studied and diplomas obtained.—
C. L.

attention of people in general to the great importance of bodily exercise for the preservation of health, and to serve as a simple guide that will enable them to benefit themselves by the performance of well-tested movements. The Swedish system of gymnastics, simply calculated to assist nature in its work, is always useful, however varying the circumstances may be, independent as it is of apparatus, &c. Consequently it is well adapted, not only to serve as educational gymnastics in the schools, and as medical gymnastics in the institutions erected for this purpose, but also as a true domestic remedy, well worthy to be treasured in every family.

The different forms of movement contained in the prescriptions (Chapter IV.) will easily be understood by means of the descriptions and illustrations given in Chapter III.

At the same time it should be borne in mind that the object of this book is not to turn people from seeking medical advice or from availing themselves of a curative gymnastic treatment by legally qualified persons, whenever they can obtain this benefit.

CHAPTER I.

On the Influence of Bodily Exercise on the Human Organism.

IT is an undeniable fact that suitable bodily exercise (together with good food, fresh air, and bathing) is the most important means for the preservation of health.

A fire can be kept up by fuel and a free supply of air; an engine can continue working as long as it is provided with sufficient steam-power, and withal kept in a normal state. Now, though the living organism does not bear any essential resemblance to these things, still it should be borne in mind that physical life might continue, without any disturbances of illness, up to old age, if the conditions on which it depends were completely fulfilled.

The living organism is absolutely distinguished from a machine by the power of regulating for itself the continual production of the amount of heat necessary to its functions, and also of determining and directing its own movements.

Heat, motion, and also mental work are dependent on the nutritive means—pure air and proper food; but it is through the action of the various organs that the

nutritive material undergoes the changes by means of which it can fulfil the conditions indispensable to the sustenance of the vital forces—heat, motion, and mental action.

Now, it has been proved beyond doubt that, through bodily exercise, the organs may be stimulated to more powerful action, to more abundant absorption of nutriment, in consequence of which both bodily and mental faculties gain in energy and health; for health is preserved through the energetic and regular activity of the organs, and a disease is cured if the disordered action of the organs, accompanying it, is brought back to a normal state.

The influence of movements on the human organism, as a whole, will be more clearly understood by the following remarks on its effects on the functions of the various organs.

1. Influence of Exercise on the Blood and its Circulation.

All parts of the body draw from the blood the material necessary for their development, and the repair of the waste constantly going on within them in producing the forces characteristic of living beings. It follows from this, that new material must constantly be taken up into the blood, instead of that used up by the organism, or else the composition of the blood will be disturbed, thus rendering it unfit for the proper nutrition of the body. The blood is, in this respect, like a

bank, which subsists through equilibrium between expenditure and income. An energetic and normal circulation promotes within the blood increased expenditure as well as increased income—that is to say, the active and normal exchange of matter and the active and normal renewal and revivifying thus effected in the material of which our body is composed, is—health.

The heart is the organ which maintains the circulation of the blood, but bodily exercise can most powerfully promote and regulate the circulation. Every one may ascertain by himself that exercise drives the blood more forcibly to the skin—for instance, as is seen in the raised colour of the cheeks and the quickened pulse following muscular exertion. The increased heat felt, when taking brisk exercise, is also a proof of a quickened circulation and increased exchange of material. Moreover, it is a well-known fact that exercise increases the appetite, which indicates the want of new materials for the blood. This is what actual experience has shown us as to bodily exercise accelerating the circulation. But there are also the most convincing *theoretical* proofs that circulation is promoted by means of muscular exercise.

Muscular contractions produce a pressure on the blood-vessels that penetrate or are contiguous to the active muscles. The effect of this pressure is somewhat different in arteries (vessels carrying blood *from* the heart) and in veins (vessels carrying blood *to* the heart), on account of the difference in their walls, and in the arrangement of their valves. The arteries

have walls endowed with great elasticity, and firmer than those of the veins; hence the blood is under greater pressure in the arteries than in the veins. The aorta (the great artery within the trunk) has three valves at its origin from the left ventricle of the heart, arranged so as to hinder the blood from flowing backwards to the heart. This being so, muscular pressure may be said rather to favour the flow of the blood towards the capillaries* than otherwise. This, however, has far less significance than the effect that muscular pressure has on the flow of the blood in the veins. The walls of the veins being softer, and having less elasticity than those of the arteries, they, consequently, exercise but little pressure on the blood. The contracting muscles, in squeezing the veins, impart additional motion to the blood. Now, there are pouch-like valves along the inside of the vein-walls, arranged in such a way that they prevent the blood from flowing backwards to the capillaries, but permit it to flow in the direction of the heart; consequently, muscular pressure on the veins must needs drive the blood forwards towards the heart. Nor is this all.

By movements, such as bending, stretching, &c., the veins are alternately shortened and extended, and this alternate stretching of them acts with a kind of sucking

* Capillaries are the hair-like tubes that unite arteries and veins, forming a network in muscular and other tissues of the body, in order that the nutritive material in the blood may pass out through their thin walls, to renew all parts of the body, and permit the waste matter to be taken up in the blood and thrown off from the body.

force on the blood within. The outer wall of the veins adheres at certain places (especially near the joints) to over-lying tissues, and is raised by certain motions, so that the diameter of the vessel becomes enlarged, a circumstance which also contributes to suck, as it were, the blood towards the heart.

From these circumstances it is evident that muscular exercise greatly influences the circulation, by assisting the flow of the venous blood towards the heart. In proportion as the movements are comprehensive, being applied to all parts of the body, and adapted to its strength, their effect on the circulation is more powerful.

But it is also possible to regulate by movements the supply of blood to each different organ, so as to produce *special* effects. Thus, undue affluence of blood to an organ where it may prove dangerous can be relieved by means of appropriate movements, so calculated as to carry the blood to parts where it causes no harm.

This shows us the importance of exercise for the preservation of health, and the necessity of a rational treatment by movements in all its disturbances.

From the great influence that muscular action has on the circulation comes the fact that appropriate movements are the most efficient curative means for diseases of the heart.*

* In severe cases of heart-disease the patient should always have recourse to a person qualified to give medical gymnastics, who will give him "passive" movements and such "active" movements as are calculated to draw the blood towards the periphery of the body without throwing any strain upon the heart.

2. Influence of Exercise on Digestion.

The want of food announces itself, under normal circumstances, through hunger; insufficient nourishment manifests itself through emaciation; and no one can live without food. These are well-known facts. It is also generally known that the food must undergo certain changes in the alimentary canal before it becomes fit to be taken up in the blood and distributed for the maintenance of the organism. For the due and prompt production of these changes, it is indispensable that the digestive organs should be in a strong and healthy state. And this depends in great measure on the manner in which we treat them. The laws of life are imperative, and will exact severe retribution if violated.

Bodily exercise is an indispensable condition for securing healthy digestive organs, and an easy digestion. The changes which the food undergoes in the alimentary canal are partly mechanical and partly chemical; consequently, both mechanical and chemical forces are necessary for effecting them. The former are supplied by the teeth and the muscular parts in the alimentary canal, the latter by the alimentary secretions—the saliva, the gastric juice, and the intestinal secretions. The muscles in the alimentary canal, with the exception of those at the beginning and the end, are of the kind that are not dependent on the will (“involuntary muscles”), but they may be indirectly acted upon by voluntary movements. It is known by experience that

strong abdominal muscles* are found where there is good digestion ; and that, on the contrary, weakness in these muscles is accompanied by weakness in the digestion. It has also been established that movements which bring the abdominal muscles to contract strongly, have a strengthening influence on the digestive organs. This is in some measure explained by the fact that contractions of the muscles which are dependent on the will ("voluntary muscles") call forth sympathetic contractions of the involuntary muscles (as, for instance, in the eye-ball).

Thus it is evident that appropriate bodily exercise has the effect of developing and preserving strong and healthy digestive organs. Many disturbances in the digestive functions would be prevented if this simple and natural means were duly employed. Chronic stomach catarrh, constipation, hæmorrhoidal complaints, and other abdominal disturbances, besides many other diseases which are consequences of these, might either be prevented or cured by a due practice of appropriate movements.

3. Influence of Exercise on Respiration.

By means of respiration through the lungs, oxygen is conveyed from the air to the blood, and distributed to all parts of the body. The oxygen combines itself with such substances as are useless or injurious to the body, and these "waste products" are carried with the blood

* The muscles forming the wall of the abdomen (the belly).

to the lungs, the skin, the intestinal tube, and the kidneys, there to be excreted and removed from the body.

The importance of a powerful respiration, by means of which plenty of oxygen is taken in and much waste matter given off, is evident, and no one can be ignorant of the effect that exercise has in increasing respiration and the respiratory power.

Deep and calm breathing is preferable to rapid and superficial. The latter way of breathing is insufficient, and indicates weakness, whereas calm and deep breathing supposes powerfully developed respiratory organs. During and after exercise respiration is both frequent and deep; thus a greater amount of oxygen is taken in, and waste matter (carbonic acid, &c.) given off.

A wide and mobile chest is generally a sign of strength in the organs of respiration. That bodily exercise developes these organs may be seen in strong labourers, seamen, and soldiers, and still more in those who make use of gymnastics in a rational manner. Contrast with these the narrow and little-moveable chest of those who lack physical education, and, in consequence of occupation or deficient energy of will, are deprived of the necessary amount of bodily exercise.

Respiration also facilitates the circulation of the blood. The lungs would not, if left to their natural volume, fill the whole cavity of the chest; but the air that rushes in through the air tubes expands them and keeps them close to the inside of the chest, which is widened by the action of the muscles concerned in

inspiration. In consequence of the great elasticity of the lungs, they re-act against the pressure of the air, and tend to shrink from their surroundings. This causes a diminished pressure of the air from within the lungs on the heart and the large blood-vessels lying within the chest, outside and between the lungs; this again acts with an attractive or sucking force on the blood towards the heart.

Now, it is true that this sucking force would tend to retain the blood in the arteries with a force corresponding to that which, in the veins, sucks the blood towards the heart, if the walls and the arrangement of the valves were quite alike in arteries and veins. But, as before mentioned, the blood in the large arteries is under great pressure, owing to the high elasticity of the walls in these vessels, whereas the pressure is very slight in the veins, their walls having but little elasticity. Moreover, the walls of the arteries are firm and resist the suction, whereas those of the veins are soft and yield to it. Finally, the three semilunar valves between the aorta and the left ventricle (being shut during the "diastole," or widening of the heart), preventing any backward flow of the blood in the arteries, and the veins being provided with valves all along their inside, which open in the direction towards the heart, there is no hindrance to the flow of the blood forwards in this direction. The consequence of all this is that the diminished pressure on the heart and the large vein-trunks within the chest (above referred to) promotes the circulation in the veins towards the heart, but has little influence on the circulation in the arteries.

To sum up shortly, exercise developes strong respiratory organs, by the energetic action of which circulation is facilitated, and also a richer exchange between the air and the blood induced. Just as a strong current of air keeps up a brisk fire—supposing there be sufficient provision of fuel—just so a powerful respiration stimulates the functions of the organs, and thus accelerates the process of renewal and exchange of material in all parts of the body, supposing, of course, that there be at the same time a good supply of food stuffs.

4. Influence of Exercise on the Process of Secretion.

By means of its circulation, the blood is distributed to every part of the body, thus affording the opportunity for the various glands to secrete out of it the fluids (“secretions”) necessary to digestion and other purposes. The blood also takes up the waste matters from the tissues and throws them off through the agency of the lungs, the skin, the kidneys, and the intestinal tube (the bowel). The rapid and complete throwing off of the waste matters is not less important for the preservation of the body than an abundant supply of appropriate food stuffs. Muscular exercise increases the circulation and the pressure of the blood within the very small arteries, which causes an increased transudation of nutritive material to fill the interspaces of surrounding textures; whereas it diminishes the pressure of the blood in the very small veins, thus facilitating the

exchange of matters between the blood and the fluid contents of the textural interspaces.

An accelerated circulation in the veins facilitates the absorption of the waste matters, and also causes the absorption from the alimentary canal of a greater quantity of nutritive material, so as to preserve the normal composition of the blood.

Now, it being a proved fact that appropriate exercise induces this accelerated circulation, this rapid renewal of the tissues, it follows, as a matter of course, that such exercise is indispensable to health. For, let me repeat it, a rapid and normal renewal of the material in the body *is health*. Just as under ordinary circumstances the merchant's profit is great in proportion as business is brisk; such is also the case with the human organism; it gains in health and strength by a rapid and duly balanced exchange of material, and we have seen that bodily exercise facilitates both the renewal of the tissues and the throwing off of the refuse.

5. Influence of Exercise on the Organs of Movement.

The idea that *exercise* must have some effect on the organs of movement is so apparent that one is apt to draw inferences at a glance from the condition of these organs, not only as to the physical power of the individual, but as to his state of health as well.

The very fact that the organs of movement form such a preponderating portion compared to other organs—their weight being about nine-tenths of the whole—

suggests at once that a powerful development of those organs must have a great influence on the organism as a whole.

Prolonged action tires the muscle, the weariness resulting from a waste within its substance, a destruction of the contracting muscular elements. But the fatigue disappears after due rest, in consequence of the used-up material having been removed. Now, movements do not diminish the volume of the muscle; on the contrary, they increase it, if applied within due limits. This shows that new substances have made good the used-up material, and this in increased measure, thus corroborating what has been demonstrated elsewhere as to muscular exercise accelerating circulation and increasing the absorption of nutritive material, the demand for this manifesting itself in an increased appetite. Muscular action, as well as the increased heat accompanying it, are forces developed at the expense of the nutritive material; but these are the very things that cause the muscles to gain in bulk and strength, supposing they be provided with sufficient nutritive material, and that there be due intervals of rest; otherwise the muscles would not be able to absorb the necessary nutriment, and consequently would begin to waste instead.

Appropriate exercise is not only necessary for the normal development and the rapid renewal of the muscles, but also for the strengthening of the passive organs of movement—the bones and the ligaments that keep these together in the joints.

The importance of strong and healthy organs of movement for the duties of life in general, but more especially for the preservation and restoration of health, is evident from the fact that it is possible to influence, through action of the muscles, not only the regenerative process of the organism as a whole, but also for local purposes, any special part of the body, when diseased.

But the development of the organs of movement may be carried beyond the limits for real health, as health has for its basis a certain harmony and equilibrium between the different organs that constitute the organism; and it is an undeniable physiological fact that excess in the development of one organ brings about weakness in another, to the detriment of health (as is often seen in acrobats and athletes). But so it is with all good things that are used in excess; and yet this does not deprive them of their qualities of goodness and usefulness when used with sense and moderation.

6. Influence of Exercise on the Nervous System and the Mental Life.

Daily experience shows us the beneficial influence that muscular exercise has on the nervous system. There is evidently a difference, as to the condition of their nerves, between working-men of all descriptions—in towns as well as in the country—and the classes of society which more or less lack bodily exercise. The former may often be suffering from various disturbances of health, but *nervous*, in the medical acceptation of the

word, they very seldom are ; whereas a more or less developed nervousness is quite the rule in those persons who, in consequence of the nature of their occupation or from any other reason, do not get a sufficient amount of muscular exercise.

This weakness of the nerves commonly manifests itself through great susceptibility and sensitiveness to both external and internal impressions. Ordinary noises, an ordinary amount of light produce painful sensations ; changes of the temperature are keenly felt. Besides head-ache, face-ache, pain in the back (and other forms of neuralgia), cardialgia (stomach-ache), palpitation of the heart, &c., are very common accompaniments to nervousness. Even the opposite character of a certain dullness is not seldom a manifestation of nervousness and an overwrought nervous system. These two opposite characters of the disease are also recognizable in the sphere of movements, either as an abnormal irritability, such as a tendency to cramp, convulsions, crying, laughing, &c., or as a weakness and numbness in the organs of movement as well as in the other organic functions in general.

Not less characteristic of nervousness is the psychical disposition shown in an irritable and unsteady temper, want of initiative and energy, or want of perseverance in pursuit.

There are, of course, many circumstances that may be concurrent causes of nervousness, and it is no exaggeration to say that our civilized life, both in private and in society, contributes to this weakness.

The present system of education, with its one-sided tendency to working exclusively on the intellectual faculties, produces but too often this weakness of the nervous system as a consequence of overstraining it and not allowing the due rest for its nutrition. How much of this over-exertion is mental, and how much of it is physical, is not an easy thing to decide, and it should be remembered that mind and body mutually influence each other to the detriment of health as well as for its benefit.

The faculties of judgment and reasoning, that should be the guide under both gay and sad vicissitudes of life, will never arrive at maturity in an individual with a diseased and irritable nervous system. He is more apt to nurse within himself a morbid sensitiveness—a misdirected imagination—that easily lead to weariness in general and indifference towards the practical everyday struggles of life, or to doubt of the higher destinies of man. Surely no one who has any experience of our modern social life can consider it calculated to consolidate judgment or augment the lucidity of the understanding, nor capable of hardening and bracing weakened nerves.

But it is the want of appropriate muscular exercise which is one of the principal inducing causes of nervousness. It has been proved scientifically that a nerve left in prolonged inactivity undergoes a sickly change, which gradually annihilates its power of action; and even our daily experience shows us how relaxed a nerve becomes through want of active use.

In order to make the influence of bodily exercise on the nervous system better understood, let us choose one instance showing the part which the nerves play in the performance of movements and the relation of the nervous system to other organs. When we bend the forearm this is effected in consequence of an impulse of the will produced by means of a peculiar action in the nerve-cells of the brain, which impulse is conducted to the muscles through certain motor nerves with a rapidity of about one hundred feet in the second. We are sensible of the action of the muscles, and this indicates that there is also a nervous impulse carried in the opposite direction—that is, from the arm to the brain, where it becomes “sensation.” Thus, both nerve-centres and peripheric nerves are brought into activity. If we now continue the observation further, we shall see that the circulation of the blood also is influenced, as a more abundant supply of renewing material is brought to the active nerves as well as to the active muscles. And we know that the whole economy of the blood is essentially affected by increased expenditure as well as by increased income; the respiration becomes more powerful, the process of digestion becomes more complete, and the secretions increase.

Thus, movements put the nervous system into action, and by this, other organs also are stimulated to action. A manifold reciprocity is brought about between the peripheric nerves and their nerve-centres through so-called reflex movements. But, as the nervous action is brought about by forces which must not be ex-

hausted, but continually kept up, it follows, as a matter of course, that the nervous exertion must stand in proportion to the supply of renewing material. Physical as well as mental over-exertion must be avoided if the nervous system is to be preserved in health and strength.

But it follows from purely physiological laws above alluded to, that *appropriate* muscular exercise acts in a stimulating and invigorating way on the nervous system, also as regards mental work.

The nervous system, and more especially the brain, is the organ for the mental forces—the whole intellectual activity. If there is a continual supply of healthy blood to the brain, then the physical condition for an energetic mental action is sustained—so far as the individual capacity admits.

And as the physical life is dependent on the exercise of the functions of the various organs, and health is the outcome of the normal action of these organs, so the mental capacities in a healthy body are kept up by means of their moderate and appropriate use. The old truth holds good: "In a healthy body dwells a healthy mind."

The functions of the different organs being intimately connected with and dependent on each other, a disturbance in one organ consequently has a disturbing influence on the other, but the organism re-acts and succeeds in overcoming a great number of such disturbances, many of which one does not even become conscious of. If it were not for this power of re-action,

the organism would soon succumb to the pernicious influences to which it is subjected. Now this power of vital re-action in the organism may be in manifold ways assisted and influenced through rational muscular exercise, by means of its effects on the functions of the organs. *Thus man has, in his own organs of movement, an efficient means for the preservation of health, and for its restoration if disturbed,* provided he wills and knows how to make an appropriate use of this means.

In the following chapters the reader will find a guide for the performance of the most serviceable movements, with short descriptions of their effects, grouped, first, in accordance with the natural divisions of the body, into arm- and leg-movements, trunk-movements and head-movements, then in prescriptions for individual states of health.

But it would be advisable for him, first, to consider the general observations on the performance of gymnastic movements contained in the next chapter.

CHAPTER II.

Some General Observations on the Performance of Movements.

1. THE movements should be performed with great accuracy, and start from a right commencing position. Every motion (bending, stretching, turning, &c.) should be fully achieved. It is only when performed in this definite way that the movements will have all the effects anticipated.

2. Each movement must be defined, not only as to form, but also as to the energy with which it should be executed, and the number of times it should be repeated. This may present some difficulties. In the description of the different movements, which begins at page 28, it is stated in figures as a guide how often the same movement should be repeated, though with great scope for individual differences. A thoughtful performer will find in his own experience of the movements a good guide in this respect. If a movement leaves an agreeable sensation, this is a sign that it has been performed with appropriate force and frequency. It often happens that a feeling of weariness or a dull pain in the muscles arises in weak persons, unaccus-

tomed to muscular exercise, but this should not induce them to leave off the movements altogether; they should only for a couple of days perform them with less energy, and also reduce their number; and then, after having practised for some time this minimum of movements, they should gradually increase them in both respects. Indeed, weak and ailing persons should always begin the exercises in this moderate way. As a rule, the movements should not induce fatigue, much less any pain in the muscles, which will not happen if the movements be proportioned to the amount of force and other peculiarities of the individual.

3. If any real benefit is to be derived from the movements, a wise order with regard to food and drink—so essential to health—must be observed. You see the labourer, when poorly fed, become exhausted and weakened by work, which, if he had substantial food, would increase his powers and strengthen his health. A starving individual cannot derive any benefit for his health from exercises. But people are more frequently at fault in taking inappropriate food or taking food in too great quantity; and it should be borne in mind that the wholesome effects of the movements will be lessened, if not quite neutralized, unless due moderation in eating and drinking be observed.

4. The movements should be performed in a well-ventilated space. Fresh air being a condition necessary to health, it follows that the performance of exercises in close, stuffy air cannot bring about the intended wholesome effect, and, indeed, any continuance in rooms

with vitiated air should be avoided as injurious to health. This is a well-known fact, but one that people cannot too often be reminded of, as they so often sin against this condition of health, and, in most cases, without any necessity. Our climate too often compels the exercises to be performed within doors, and an over-carefulness too frequently prevents the admission of a sufficient amount of fresh air. Though it be true that one may easily catch cold indoors, it is not less true that too warm and close an atmosphere develops in us a delicacy and a tendency to diseases which will be sure to manifest themselves sooner or later as unavoidable consequences. Delicacy and over-carefulness are amongst the most dangerous enemies of health, whereas a sensible and moderate inuring to the influences of cool and fresh air is a powerful means for preserving health. Exercises performed in such air have more than double the beneficial influence which they would have when performed in less pure air.

5. A frequent and prudent use of cold baths and washing, being of great importance for the preservation of health, should be practised in connection with the gymnastic exercises and immediately preceding them in the morning. If people would but satisfy themselves by experience as to the usefulness of this procedure, then the aversion to the external use of cold water, which even in our days is not unfrequently to be met with, would be sure to disappear. If a reasonable diet be observed, if appropriate gymnastic exercises be daily performed, if fresh air and water become a daily

treat, then bodily as well as mental power will increase, and many ailments will disappear.

6. A rational use of gymnastic exercises does not imply an endeavour to perform an infinite number of movements, still less an attempt to perform *all* movements that lie within the reach of possibility. Such efforts have no foundation either in science or sober experience. The human organism is limited in its action, as well on its physical as on its mental side, and whatever goes beyond a certain limit is injurious to it.

7. Gymnastic exercises should not be performed within one or two hours after a full meal, nor just immediately before it. The series of movements contained in a prescription should be performed *at least* once a day, and their beneficial influence will be increased if they are performed several times each day, provided they be well proportioned to the forces and the state of the performer. A weakly person should take only a very limited number of movements each time, and repeat these frequently during the day; or he may divide a prescription, and perform the parts at different times in the day. After washing or bathing the whole body in the morning, it is most useful to stimulate the action of the organs by some suitable exercises. And we may repeat here what is mentioned in another place, that a person who has adopted the habit of practising systematic gymnastic exercises will find, by means of observing their effects upon himself, an excellent guide for their application in accordance with the requirements of health.

8. It is most essential not to hold one's breath during the movements, but always to take quiet and deep breaths whilst performing them. There should also be a short interval between each exercise, which should be devoted to walking up and down whilst breathing deeply—at least, by those who have the use of their limbs. The dress for the exercises should be as light and loose as possible.

CHAPTER III.

Description of Particular Forms of Movements and their Effects.

ARM-MOVEMENTS.

1. Standing* Arm-Raising, sideways upwards, 8—16 times.



No 1.

The stretched arms are moved slowly sideways and upwards, till they attain a vertical position above the head, hands and fingers well stretched. While moving to this position, the arms are gently rotated outwards, so as to make the palms face each other when stretched overhead. Head and trunk to be kept straight, chest arched forwards, and arms kept well back during the movement. Without delay the arms are again slowly lowered through the same plane, till they re-assume the commencing position.

Effect : This exercise causes a stretching of the back and the neck, and a pulling backwards

* Persons having some difficulty in standing may perform this and similar movements in a sitting posture.

of the shoulders, by bringing the muscles of the back and the back of the neck into action. The fore-arms, hands, and fingers being also kept on the stretch, their *extensors* (stretching muscles) are contracted during the movement. But the muscles that are put into the strongest action are those that raise the arms.

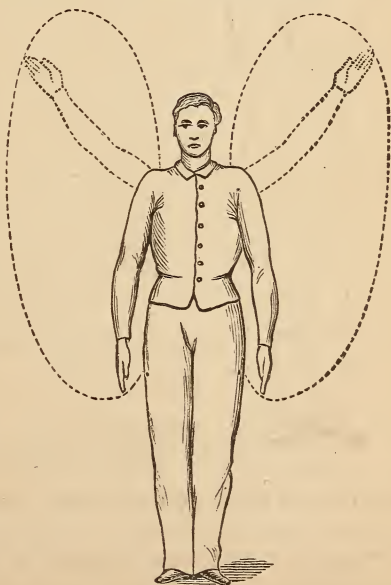
This exercise tends to widen the chest and increase its mobility. It is an appropriate movement in general weakness, nervous debility, anæmia (poorness of the blood), weakness of the chest, difficulty of breathing, adhesion of the pleuræ (the bags surrounding the lungs).

Weak persons may experience some difficulty in raising the arms up to the vertical position; if so, they may at first stop at the horizontal position, till they shall have overcome this difficulty through practice.

2. Standing Arm-Circling, 8—16 times.

The stretched arms are slowly moved straight forwards, upwards, and sideways down again, so as to describe a circle. After some practice the slow measure may alternate with a somewhat quicker performance.

During this exercise the muscles of the back, and those of the back



No. 2.

of the neck, should keep the spinal column and the head quite straight; the hands also stretched by their extensors.

Effect: The movement is carried out by muscles situated on the shoulders and the blade-bones. It acts energetically on the shoulder-joints, increasing their strength and mobility; it also widens the chest, and has a blood-relieving effect on the organs of the chest and head—that is, relieves these organs from congestion.

3. Standing Arm-Thrusting, forwards upwards, 6—12 times.

The stretched arms are quickly raised forwards upwards, so as to attain a vertical position at each side of the head; then they are slowly lowered sideways downwards, close to the sides.

Effect: This movement resembles the preceding one, in so far as it describes the same figure, and calls the same muscles into action; but the raising of the arms is performed in quicker time and with greater energy (a kind of jerking motion), on which account it also has a more powerful effect. It may be used with advantage as a sequel to the preceding exercise, when this one has been practised for some time.

4. Standing Shoulder-Circling, 10—12 times.

The shoulders are slowly moved, so as to describe a circle forwards, upwards, backwards, and downwards.

Effect: This exercise is performed by muscles

attached round the shoulder-joints and to the shoulder-blades. The shoulder-ring (*i.e.*, the shoulder-blades and the collar-bones), as well as the joints and muscles belonging to the shoulders, are benefited by this exercise. During its performance the head is kept well up and the back stretched, which causes this exercise to have a very powerful effect on the respiratory organs. It counteracts weakness of the chest and tendency to catarrh of the lungs and consumption.

5. Wing-Standing Elbow-Moving, backwards,
8—10 times.

The hands are placed on the hips, the thumbs directed backwards, the other fingers forwards, the elbows sideways. From this position the elbows are slowly moved backwards as far as possible, without any violent effort. Then they are allowed to go back to the commencing position, and the exercise is repeated in the same way. The head and the back should be well stretched, for in this case a powerful pulling backwards of the shoulder-blades and shoulders, and also an expansion of the chest take place.



No. 5.

Effect: This exercise counteracts a tendency to flatness of the chest, in strengthening the muscles that draw the shoulders and blade-bones backwards and arch the chest forwards.

32 *Standing Arm-Bending and Stretching, upwards.*

It counteracts tendency to consumption, asthma, and weakness of the chest.

6. Standing Arm-Bending and Stretching, upwards, 8—16 times.



No. 6.

The fore-arms are quickly bent upwards against the upper arms, the elbows kept close to the sides, the fingers slightly bent and pointing towards the shoulders. From this position the arms are sharply and energetically stretched upwards to a vertical position above the head (points of fingers foremost), the palms of the hands facing each other. This alternate bending and stretching of the arms to be repeated as stated above.

Effect: See Note to No. 9.

7. Standing Arm-Bending and Stretching, sideways, 8—16 times.

The arm-bending is performed as in the preceding exercise, then the arms are stretched horizontally sideways in a sharp and energetic manner (points of fingers foremost), the palms turned downwards, as in the figure No. 11. The arms should be kept well back, so as to ease the chest and arch it forwards. The bending and stretching to be repeated as stated above.

Effect: See Note to No. 9.

8. Standing Arm-Bending and Stretching, forwards,

8—16 times.

From the bend-position (see 6) the arms are quickly and energetically stretched horizontally forwards parallel to each other, the palms facing each other.

Effect : See Note to No. 9.



No. 8.

9. Standing Arm-Bending and Stretching, backwards, 6—12 times

From the bend-position (see 6) the arms are stretched backwards in as high a level as they possibly can be brought to without too great exertion, the palms facing each other. The head and back to be kept upright and quiet during the movement.

Note to 6, 7, 8, and 9.—The above-mentioned arm-stretchings in different directions all proceed from a common starting position—the arm-bend position. They act powerfully on the flexors and extensors (bending and stretching muscles) of the arms, and the muscles of the chest; the back and the neck also have an important share in the action. Moreover, these arm-movements increase the suppleness and strength of the shoulder and elbow joints, and tend to widen the framework of the chest. Thus, the arm-stretching *upwards*

34 *Standing Arm-Bending and Stretching, backwards.*

widens the chest more especially in its lower and middle parts. The arm-stretching *sideways* expands the chest especially in its further and upper parts. The arm-stretching *forwards* causes the hinder and lower parts of the lungs to take in more air. If, in the arm-stretching *backwards*, the head and the back be kept perfectly straight, and the shoulders drawn backwards, this movement causes a widening of the chest in raising the upper ribs by means of a passive stretching of the muscles attached to them. Altogether, these bendings and stretchings of the arms in different directions have an extensive and powerful influence on respiration and circulation, besides their strong action on the muscles concerned in the movements, and above referred to. This assigns to them an important place in a prescription of movements for a general strengthening of the body. They are a specific remedy against weakness and rheumatic pains in the muscles and joints concerned in performing these movements. To persons with weak breathing power—common in those who lead a sedentary life—these movements are exceedingly valuable on account of the effect they have in strengthening the organs of respiration. In cases of poorness of the blood, nervous debility, and general weakness, they are useful, stimulating, as they do, the vital functions. In cases of chronic catarrh of the lungs, these movements are serviceable as a blood-relieving means. Persons with a weak chest should, however, use them with due precaution. In cases of severe lung or heart disease, they should never be used without the advice

of the physician. The energy in the performance of these movements should always be modified according to different individual circumstances.

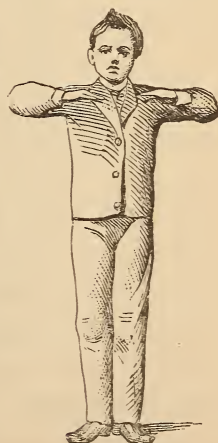
The above arm-stretchings may also be executed alternately—that is, instead of stretching both arms in the *same* direction, after having been previously bent upwards, they are stretched simultaneously in *different* directions, and then made to alternate with each other; thus: (*a*) one arm upwards, the other downwards; (*b*) one upwards, the other forwards; (*c*) one forwards, the other sideways; (*d*) one upwards, the other sideways. In any case the respective positions of the arms should be exchanged several times.

The effects of these alternate arm-stretchings in different directions are more powerful than when both arms are stretched in the same direction.

Each bending and stretching in all the above-mentioned exercises should be completed with great accuracy.

10. Standing Arm-Bending forwards and Arm-Flinging outwards, 6–12 times.

The upper-arms are raised horizontally, with the fore-arms sharply bent upon them, hands and fingers stretched, palms turned downwards. From this position the fore-arms are smartly and energetically thrust outwards, without any displacement of the upper-arms. The fore-arms being again quietly bent forwards in the



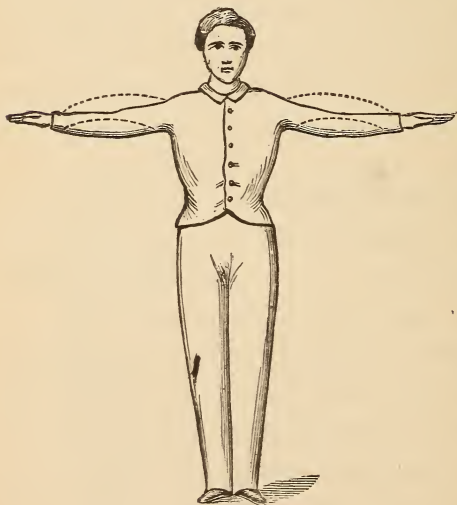
No. 10.

same plane, the flinging motion outwards is repeated anew.

Effect: This movement has very much the same effect as the arm-stretching sideways (see Nos. 7 and 9), but it causes a stronger tension forwards of the chest; hence it is a specific remedy against a flattened and weakly chest. It is also especially strengthening for the muscles that stretch the arm in the elbow-joint.

11. Cross-Standing Arm-Rotation, inwards and outwards, 10—20 times.

The arms, being previously stretched sideways (cross-standing position), are rotated round their long axis inwards (pronation) and outwards (supination). This



No. 11.

rotatory movement is executed partly in the shoulder-joint, partly through the radius being rotated round the ulna (the elbow-bone), which latter action causes the hand to be turned also.

Effect: This movement,

though apparently very simple, calls forth the action of a great many muscles situated on the arms, the shoulder, the chest, the back, most of them being the

same as those concerned in bending and stretching the arms, but in this case acting in a peculiarly modified manner. Besides strengthening the shoulder-joints and the muscles concerned, it has a blood-relieving effect on the organs of the chest.

It may also be combined with arm-raising (see No. 1); in this case it strongly influences the respiration.

12. Hand- and Finger-Movements, 8—16 times.

(a) The hand may be bent towards the fore-side of the arm and stretched towards the back of the arm; it may also be bent outwards (“abducted”)—that is, to the side of the thumb; and it may be bent inwards (“adducted”)—that is, towards the side of the little finger.

All these movements should be performed to the extent that the wrist-joints admit of, and repeated 8—16 times in each direction.

(b) A simultaneous and energetic bending of all the fingers, followed by a stretching in the same manner, to be performed as many times as the above.

(c) A simultaneous spreading and closing of all the fingers (being well stretched), also repeated as above.

Effect: These hand and finger exercises, though of great importance, are generally very much neglected. They call into action nearly all the muscles of the forearm, and exert a direct influence on the joints of the wrist and the fingers. If duly performed two or three times a day, these movements will counteract the weakness that so frequently arises in the hands and the

arms from much writing, practising on the piano or the violin, &c. These movements are also effective against cold hands; and they are suitable, in cases of disturbances in the organs of the chest, as a means of relieving these organs from congestion.

These hand and finger exercises may also be performed in combination with the arm-raising (see No. 1) or the arm-rotation (see No. 11), which will greatly increase their effect.

13. Standing Alternate Arm-Thrusting, one arm up, the other down, 8—16 times.

One arm being stretched upwards, the other downwards, the respective positions of the arms should be exchanged by means of a quick and energetic thrusting of the down-stretched arm upwards and the up-stretched arm downwards.

Effect: This movement tends to increase the mobility of the shoulder-joints and strengthen the muscles of the shoulder; it also stimulates respiration and circulation.

14. Half-Stretch - Grasp-Standing Arm-Circling, 8—16 times.

One arm being stretched up, the hand takes hold of a bar or a door-post, or anything of the kind, at arm's length above the head. The free arm performs the circling motion that is described in No. 2. The movement should be repeated, and the position changed alternately with both arms.

Effect : The starting position expands the chest, and by this means this arm-movement has a more powerful influence on the respiration and circulation, without any great increase in the exertion.

15. Half-Stretch-Grasp-Standing Arm-Bending and Stretching, 6—12 times.

After having assumed with one arm the starting position indicated in No. 14, the other arm should be bent and stretched as described for both arms in No. 6. A proper alternation in position and motion of the arms should be observed.

Effect : This exercise has a strengthening effect on respiration and circulation.

16. Reach-Grasp-Standing Arm-Bending and Stretching, 6—12 times.

The performer should stand facing a bar, a wall, or a closed door, at a distance of three feet. He then should place his hands against the object mentioned, separating them at shoulder's breadth. This being done, the body is inclined forwards, resting its weight on the arms, which should be bent at the elbow-joints to right angles—elbows turned outwards on a level with the shoulders. Now the arms are slowly stretched again—somewhat resisted in this motion by the weight of the body—then the arms are bent again, and so on.

Effect : This exercise calls the extensor muscles of the arms into very strong action, the stronger the more the weight of the body is thrown upon the arms

besides, the bending of the arms in this position expands the chest and promotes respiration.

17. Trunk-Lifting by the Arms, 5—8 times.

This exercise requires some kind of apparatus—a fixed horizontal bar or board, or two hanging thick ropes fixed with two feet distance between them; in fact, anything of this kind arranged in the room will do for the purpose when attainable by the up-stretched arms. The hands grasp the support with up-stretched arms, having between them a distance corresponding to the breadth of the shoulders. This being done, the arms are slowly bent, thereby effecting a lifting of the body; the arms then are slowly stretched again, and the body lowered till the feet touch the ground (toes first).

This exercise acts very strongly upon the flexor muscles of the arms and on the respiratory organs.

A certain bodily strength is required for this movement, hence it cannot be performed by weak persons. It should *never* be used in severe cases of lung or heart disease.

LEG MOVEMENTS.

18. Standing Alternate Toe-and-Heel-Raising, 10—12 times.



The heels are first raised so as to throw the whole weight of the body on the toes, then the heels are lowered simultaneously and the toes raised, thus throwing the weight of the body on the heels, and so on.

No. 18a.

During the exercise the body should be kept upright, only accommodating itself so far as to be able to keep its balance during the movement.

Effect: This exercise is performed by the action of the muscles of the leg proper and of the feet, and consequently has a strengthening influence on these muscles. Besides, it brings a considerable number of muscles into action for the preservation of equilibrium during the exercise. This movement is a remedy against cold feet, which so often are to be found in people who lead a sedentary life, and generally in people who suffer from poorness of the blood and general debility. It is also a remedy against stiffness in the ankle-joints.

Note.—This alternate raising of the heels and the toes may be performed, not only from the general fundamental position (as represented in fig. 18*a*), but also in alternating this position with the close-position of the feet, as represented in fig. 18*b*. This turning inwards and outwards ("closing" and "opening" of the feet), added to the alternate raising of the heels and toes, also increases the effects of the exercise in tending to strengthen the hip-joints and the surrounding muscles.



No. 18*b*.

19. Wing-Standing Foot-Circling, 12—20 times.

This movement may be performed either standing, with the hands placed firmly on the hips ("wing-standing position"), or sitting, with support for the back. If performed from the former position, one leg

should be stretched forwards and the foot caused to perform a circling motion, which should be repeated several times, first to one side, then to the other.



No. 19.

Persons who experience some difficulty in standing on one leg may support themselves with one hand against some fixed object, or perform the foot-circling sitting. In the last-named case the movement may be performed either alternately or simultaneously with both feet. If alternately, one knee should be laid across the other, the support thus afforded to the leg by which the movement is performed helping to concentrate the motion more exclusively on the ankle-

joint. If performed simultaneously with both feet, the legs should be stretched forwards, the heels resting on the floor. The feet then should perform the circling motion several times inwards and then several times outwards.

Effect: This movement is executed by the muscles of the leg proper. It increases the mobility of the ankle-joint, makes the feet warm, and relieves internal organs from undue affluence of blood.

20. Sitting Toe-Bending and Stretching, 12—20 times.

In the above exercise (19) the toes are put into some

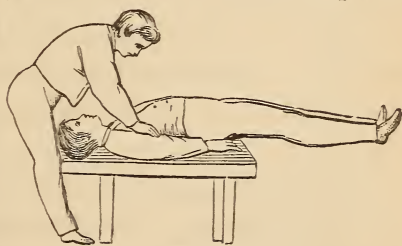
motion, but in a very imperfect manner, especially if the foot-circling be not performed in very wide shoes. A real exercise for the toes will be supplied by their bending and stretching, without moving the rest of the foot. This movement must be performed either without shoes or in very wide and soft ones.

The importance of this exercise lies in the fact that it can counteract or remedy the tendency to the deformity and partial paralysis of the toes so often brought about through unsuitable shoes and stockings.*

Effect : This exercise, besides keeping up the mobility of the toes by strengthening their muscles, also tends to warm the feet.

21. Lying Leg-Circling, 8—16 times.

Head and trunk should rest horizontally on some plane surface raised above the ground, the legs stretched beyond the support. (A strong person may keep himself in this position by taking hold of the edge with his hands; a less strong person should have some assistance with pressure on the shoulders, as seen in



No. 21.

fig. 21; very weak people should never perform this exercise at all.) The legs perform simultaneously a circling motion, first to the left and then to the right

* The cause of the evil must, of course, be got rid of in order to obtain real results from the exercise.

Effect: This exercise acts upon the abdominal muscles and those surrounding the hip-joints, and has a specially blood-relieving and strengthening effect on the organs in the lower abdomen (the pelvis). If performed with the arms stretched above the head it increases respiration.

22. Half-Lying Leg-Bending and Stretching, 6—10 times.

The back and head recline backwards on a slanting support. One leg at a time is sharply drawn up, with the knee bent towards the side of the chest, and then fully stretched forwards, the point of the foot foremost. This being repeated several times, the other leg should perform the same motions.

Effect: When performed with energy, this exercise has a strengthening influence on the legs and a blood-relieving effect on the upper parts of the body.

23. Standing Knee-Bending and Stretching, 5—10 times.



No. 23.

First the heels are raised, then the knees are slowly bent to right angles, then slowly stretched again, and finally the heels lowered to the ground. The exercise is repeated as stated above. The trunk and head should be kept quite straight during the exercise. When, through practice, stability in performance is secured, the slow movement may alternate with a quick one.

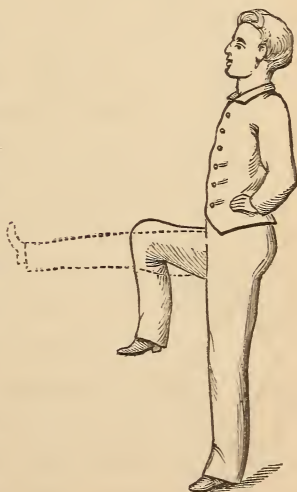
Effect: This exercise acts strongly on the extensor muscles of the legs ; and, on account of the rigidity of the head and back that should be observed during the exercise, it also brings the extensor muscles of these parts into action. It tends to make the joints of the lower extremities supple and strong, and has a blood-relieving effect on the upper parts of the body.

Note.—The same exercise may be performed from—
(a) Wing-Standing position (hands on hips) ; (b) Stretch-Standing position (arms stretched upwards) ; (c) Cross-Standing position (arms stretched sideways) ; by which positions, more especially the two last-mentioned ones, the respiration and circulation are increased.

24. Balance-Standing Leg-Movements.

(a) *Wing-Hook-Standing Leg-Stretching, forwards,*
4—8 times.

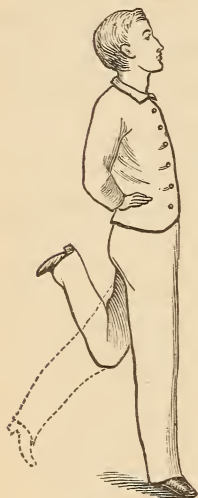
The hands are placed on the hips. One knee is bent upwards, so that the thigh forms a right angle with the trunk, and another with the leg proper. Now the knee is stretched forwards, so as to bring the leg proper in a straight line with the thigh (point of foot foremost during the whole exercise). The knee should again be bent, and then the foot placed down heel to heel with the



No. 24.

other one. The same exercise with the other leg, and so on alternately.

(b) *Wing-Hook-Standing Leg-Stretching, outwards, 4—8 times.*



No. 24c.

The knee being bent upwards as in the preceding exercise, and turned outwards, the leg should be stretched out and finally brought back to the fundamental position (heel to heel). Now the same exercise with the other leg, and so on alternately.

(c) *Wing-Standing Leg-Folding and Stretching, backwards, 4—8 times.*

The leg first tightly bent (folded) in the knee-joint, is stretched backwards (see 24 c) as far as possible, and finally brought back to the fundamental position. Then the other leg performs the same exercise, and so on.

(d) *Wing-Standing Leg-Circling, 6—10 times*

The stretched leg performs a wide circling motion directed forwards, outwards, and backwards. It then re-assumes the fundamental position, and the other leg performs a similar motion.



No. 24d.

Note.—The four movements in the above group require a precision and readiness in the action of the muscles, so that they cannot be well performed if one has not already had some practice in exercises. They gradually increase the power of balancing, and the influence of the will over the muscles; they also tend to make the lower extremities supple and elastic.

25. Wing-Standing Alternate Knee-Lifting, 15—20 times.

The hands are placed on the hips; the knees are alternately lifted in a bent position as quickly and as high as is possible, without any too great exertion. Thus the weight of the body is thrown now on one foot now on the other (the toes first touching the ground). Head and trunk should be kept quiet in an upright and easy position, the chest well arched forwards. The exercise may begin in a slow walking measure, and then gradually increase in rapidity till it attains the quickness of running. In the last case it becomes very straining and should not be exaggerated, but wisely moderated according to individual circumstances.



No. 25.

Effect: This exercise, besides strengthening the lower extremities and making them supple and agile, greatly stimulates respiration and circulation, and, if performed with due moderation, produces an agreeable and genial warmth.

(The observation on page 23 should be constantly borne in mind—namely, that all the exercises should be performed with the greatest accuracy and attention, in order to secure the effects aimed at.)

TRUNK-MOVEMENTS.

Movements of the trunk may be performed in the following main directions:—Bending forwards, backwards, and to the sides, also turning or rotation round its long axis. The trunk may also be made to describe a circle (“circling,” or moving in circumduction), which is, properly speaking, a combination of the consecutive bendings of the trunk in all the above-mentioned directions.

26. Wing-Standing Trunk-Bending, forwards and backwards, 5—10 times.



No. 26.

The trunk is slowly bent forwards from the hip-joints, then raised again and bent backwards in a similar manner, as far as the individual capacity allows, without any great exertion. During the exercise the legs should be kept straight, the chest arched forwards, the head not allowed to droop.

Effect: By means of the alternate gentle contractions and extensions of the muscles of the further and hinder side of the trunk, caused by this exercise, it stimulates and facilitates the functions of the organs in the chest

and the abdomen. It causes an alternate stretching and shortening of the great veins, and thus stimulates the circulation of the blood within the abdomen, the chest, and the head, thereby counteracting many disturbances brought about by impediments in the circulation.

27. Standing Side-Bending, 5—10 times.

The trunk is slowly bent alternately to the left and the right without any twisting (fig. 27). The bending should be carried as far as it is possible without any great exertion, the legs kept straight; head and arms should accompany the motion without being moved separately. The effects of this exercise may be increased in strength if it is performed from—(a) *Stretch-Standing position* (arms stretched above the head, see No. 6); (b) *Neck-Rest Standing position* (arms bent up behind the head, fingers dovetailing in each other, the back of the head resting against these; see fig. 28b); (c) *Half-Stretch Standing position* (one arm stretched above the head), with bending to the opposite side of the stretched arm.



No. 27.

Effect: This exercise, like the preceding one, greatly increases the rapidity of the circulation, especially in the portal vein (which carries blood from the stomach and intestines to the liver). If properly performed, the exercise is distinctly felt in the muscles (and the

skin) at each side of the waist, which are alternately contracted and extended.



No. 28a.

28. Trunk-Turning, 5—10 times.

(a) *Wing-Standing Trunk-Turning.*

Hands placed on hips. The trunk is turned (rotated) round its long axis alternately to the left and the right without moving the legs. The back and the legs are kept straight during the movement.

(b) *Neck - Rest Standing Trunk-Turning.*

The commencing position should be taken as in fig. 28b (the elbows pointing sideways, not forwards); then the movement should be performed as indicated above.



No. 28b.

Effect: A great number of the muscles of the trunk (having such a position relatively to each other as to make them co-operate in the turning) are brought into action by this movement, which, though effective, is by no means one requiring much exertion. The energy of its execution can easily be modified according to individual strength. It acts in a stimulating manner on the

spine, on the organs of the abdomen, and also on respira-

tion, this more especially when performed in the last-mentioned position. The pressure of the abdominal muscles on the intestines, alternating from one side to the other, effects on them a kind of kneading motion which stimulates their function. The turnings also cause an alternate shortening and extension of the great blood-vessels, and promote circulation.

Note—This movement may be strengthened, if performed with the feet in close-position (see fig. 18*b*).

29. Wing - Stride - Standing Trunk - Circling

6—10 times.

The commencing position is, hands on hips, feet placed sideways with a distance of two feet between them. The trunk is moved from the waist, describing as large a circle as possible, first to the left, then to the right. The legs should be kept straight, the hips and head steady. (Persons who find it difficult to stand may perform this exercise sitting.)

Effect : This movement is performed chiefly by means of the muscles of the trunk situated around the hips. It causes a general compression of the viscera of the abdomen, and tends to remove constipation. By effecting an alternate shortening and extension of the great



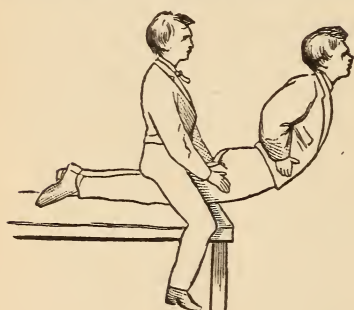
No. 29.

blood-vessels, it promotes the circulation of the blood, more especially within the abdominal cavity. It counteracts many disturbances within the organs of the true pelvis (below the abdomen), such as catarrh of the bladder or the womb, hæmorrhoids, &c.

Not.—This exercise may be strengthened in its effects, if, during the circling movement, the trunk is also turned (rotated round its long axis) to the left whilst circling to the left, and *vice versa*.

30. Wing-Forward-Lying Trunk-Holding, 3—6 times.

The performer having placed himself on a bench covered by a mattress,* in such a position that the front of his legs is supported up to (but not beyond) the hip-



No 30.

joints, and kept steady in this position by a person sitting on his legs (see fig. 30), or a broad strap being fixed across them, he should place his hands firmly on his hips, and then raise his head and trunk as much as possible.

Having kept this position a short while, then he should slowly lower head and trunk towards the ground; then again perform the raising, and so on, alternately raising and lowering the trunk.

* A sofa or some chairs put together will also do for the purpose.

Effect: This exercise brings into strong action the extensor muscles of the back and the neck. It is an excellent movement for the development of an upright and easy bearing. It keeps the extensor muscles at both sides of the spine in equilibrium, thus counter-acting any tendency to lateral curvatures of the spine. It counteracts, more than any other movement, the stooping of the frame which is so easily induced in weak or near-sighted people, and so common in old age.

31. Wing-Backward-Lying Trunk - Raising, 4—8 times.

In this exercise the back of the legs rests on the support, and they are kept in their place as mentioned in No. 30. The upper part of the body is beyond the support, and is kept in a horizontal position by the action of the abdominal muscles. After having maintained this position for a short while, the trunk is raised to sitting position, then slowly lowered to the horizontal position, and so on.



No. 31.

Effect: This exercise has a very strengthening effect on the muscles of the abdomen, and on digestion, it is also an effective means against costiveness.

(To weak persons this exercise is rather straining, and they want, at first, somebody to help them. Strong per-

sons may increase the effect of the movement by keeping their arms stretched above the head.)

32. Sit-Lying Trunk-Raising, 3-6 times.

The whole upper part of the body from the knees rests on the support. The knees are bent, the foot-soles resting on the floor as when sitting. Some pressure



No. 32.

should be applied on the knees, either by some person's hands or by a fixed strap, to enable the performer to raise the trunk steadily (keeping it quite

stiff) to sitting posture. From this he should again go slowly down on his back, and so on.

Effect: This exercise has very much the same effect as the preceding one, but is somewhat easier to perform.

33. Stretch-Stride-Standing Trunk-Bending, forwards and backwards, 4-8 times.

The arms are stretched above the head, the feet placed sideways at a distance of two feet from each other. From this starting position the trunk is slowly bent forwards and downwards, as far as the individual capacity allows without any too great exertion. It is then slowly raised again, and bent backwards under the same conditions. The arms and head should not be moved separately, but accompany the motions without any change in their relative positions.

This exercise causes an alternate shortening and

lengthening of the muscles on the further and hinder parts of the trunk and pelvis. It also causes a similar shortening and extension of the veins, by means of which the circulation of the blood is promoted. It has a stimulating effect on the functions of the vital organs in general.

34. Cross - Stride - Standing Jerk - Turning,
6—10 times.

The arms are stretched horizontally sideways, the feet placed sideways as in the preceding exercise. A sudden and jerking (but not violent) turning (rotation) of the trunk is performed to the left and right alternately. The arms are kept steady in their position and the legs straight.

Effect: This exercise is performed chiefly by the muscles situated round the hips, and acts powerfully on the abdomen and pelvis, accelerating circulation more especially in these parts of the body. It has a highly stimulating effect, and is a *specific* in difficult breathing, as in lung emphysema and cramp in the chest (*angina pectoris*).

35. Wing - Stride - Forward - Bend - Sitting Screw-Rotation, 8—16 times.

The performer is seated with the feet separated and hands on hips. The head and the trunk are inclined forwards so as to form an acute angle at the hip-joints. In this position the trunk is rotated alternately to the left and right by quick jerking (screwing) motions without losing the inclined position.

Effect: This exercise is most effective against slow circulation in the lower abdomen, in chronic diarrhœa, gastric catarrh, hæmorrhoids, catarrh of the bladder, &c.

HEAD MOVEMENTS.

The movements of the head (or, properly speaking, of the neck) consist, like those of the trunk, in *bending*, *turning* (rotation), and *circling* (moving in circumduction). They are easy to understand from description alone, without any illustrations being necessary.

36. Head-Bending, forwards and backwards, 5--10 times.

The head is slowly bent forwards, then raised in the same manner, and finally bent backwards as far as can be done without any great exertion; then raised again, and so on. The rest of the body is kept steady during the exercise.

37. Standing Head-Bending sideways, 5—10 times.

The head is bent alternately to the left and right, as far as the mobility in the vertebræ of the neck permits without any great strain, and without moving the rest of the body.

38a. Standing Head-Turning, 5—10 times.

The head is turned alternately to the left and right, as far as convenient. This should be performed without any bending of the head or turning of the shoulders.

38b. Standing Alternate Head-Turning and Bending, 5—10 times.

The head, being previously turned to the left, is bent forwards, then raised and bent backwards, still retaining its turn-position; then raised again and turned to the opposite side, where the bendings are performed in the manner before stated.

39. Standing Head-Circling, 6--10 times.

The head describes slowly as wide a circle as can be done without straining, several times to the left and then as many times to the right. The shoulders, as well as the rest of the body, to be kept perfectly quiet during the motion.

Note.—None of the above head-movements call for any great muscular exertion, but they have not the less a general stimulating and strengthening effect on the muscles of the neck. They counteract and cure stiffness in the joints between the vertebræ of the neck and the head. They also promote circulation in the brain, especially if performed with deep breathing. Consequently they are effective in cases of either congestion of blood in the brain or too small supply of blood to that organ.

The following movement, being a complex one, can be performed in an accurate manner only by people who have acquired some previous practice in simple exercises.

It should be borne in mind that the organs of movement in man possess a capability of great *variation* in the form of movements, as well as the possibility of attaining by practice the utmost perfection of purity and beauty of form in each of them. What an immense difference between the tottering movements of the infant, or the want of precision in the performance of new motions in any untrained person, when compared with the great perfection in execution to which a person may attain by training.

Any exercise that, being in strict accordance with physiological and hygienic laws, is calculated to overcome our natural "awkwardness," and bring about ease and precision and general sense of equilibrium in movement, is a well-defined and good exercise.

It is by the use of such exercises that the will acquires the full domination over the so-called voluntary muscles, and enables them to perform the movements in accordance with the ideal formed by the mind.

This is in perfect analogy with the methodical mental exercises for the brain, by means of which the mental faculties are brought to their full development and clearness, and the individual exercised in the use of them.*

* The analogy between the processes of developing mind and body by means of systematic education will be fully put forth in a work on "Scientific Physical Education" that I am preparing.
—C. L.

40. Pass - Positions with Foot - and Arm-Changing, 6—12 times to each side.

Essentially the same form of movement as the “fencing pass.” The feet are placed at a right angle, heels together, the arms are bent in the elbow-joints, fingers pointing towards the shoulder. Now the left foot is moved in its own direction (outwards), and placed on the floor at a distance of three foot-lengths from the heel of the right foot. At the moment that the foot touches



No. 40.

the floor, the left knee is bent so as to stand just over the point of the foot, and the weight of the body is thrown on this leg. The other leg is stretched, so as to form one straight and slanting line with the trunk and head. Simultaneously with

the left foot assuming the described position, the left arm is stretched above the head and the right one backwards (see fig. 40). Now the slanting position is resumed (heels together, arms bent), and then the same movement should be performed to the opposite side by the right foot and arm.

This exercise may be varied thus :—

(a) Instead of moving the left foot three foot-lengths

forwards-outwards, as in the above, it may be moved the same distance backwards-outwards (that is, in a straight line with the long axis of the other foot). In this case the further (the right) knee is bent, and the corresponding arm stretched upwards, the other backwards, and so on.

(b) The foot may be placed three foot-lengths straight forwards, or three foot-lengths straight backwards. In the last cases, as in the first one, the movement should be performed the same number of times with one foot as with the other, the knee of the *further* leg bent and the corresponding arm stretched upwards, the other backwards.

The exercise should be performed slowly at first, but when due accuracy in its performance is acquired, it may be performed with great smartness. An alternation of slow performance with more rapid will prove advantageous.

Effect: This exercise brings about a very extensive nervous and muscular action, and has a general stimulating and strengthening effect. It produces elasticity and ease in bearing. However, it should, like all other movements for hygienic purposes, be kept within the limits of moderation.

CHAPTER IV.

Application of Movements for Specific Purposes.

Strengthening Movements for persons whose daily occupations do not afford them sufficiently all-sided muscular exercise, and who are suffering, more or less, from poorness of the blood (anæmia), muscular and nervous debility, weak respiration, gout, obesity.

PREScription I.

- | | | |
|--|-----------|------------|
| 1. Standing Arm-Raising, sideways upwards | . | See No. 1* |
| 2. Neck-Rest-Standing Trunk-Turning | . . . | 28B |
| 3. Standing Alternate Toe- and Heel-Raising | . . . | 18A |
| 4. Standing Arm-Bending and Stretching upwards | . . . | 6 |
| 5. Wing-Stride-Standing Trunk-Circling | . . . | 29 |
| 6. Wing-Hook-Standing Knee-Stretching forwards | . . . | 24A |
| 7. Standing Head-Circling | | 39 |
| 8. Wing-Standing Elbow-Moving Backwards | . . . | 5 |

PREScription II.

- | | | |
|---|-----------|-------|
| 1. Standing Arm-Circling | | No. 2 |
| 2. Standing Alternate Toe- and Heel-Raising | . . . | 18A |

* The figures in this column refer to the descriptions of the Movements given in Chapter III.

- | | |
|---|-------------|
| 3. Wing-Standing Trunk-Bending, forwards and backwards | See No. 26* |
| 4. Wing-Standing Alternate Knee-Lifting | 25 |
| 5. Standing Arm-Bending and Stretching, upwards, sideways, and forwards | 6, 7, 8 |
| 6. Stretch-Standing Side-Bending | 27 |
| 7. Standing Arm-Raising, sideways upwards, with Rotation inwards and outwards | 1, 11 |
| 8. Standing Head-Bending, forwards, backwards, and sideways | 36, 37 |
| 9. Standing Arm-Raising | 1 |

PREScription III.

- | | |
|---|---------|
| 1. Standing Arm-Thrusting, forwards upwards | 3 |
| 2. Cross-Standing Knee-Bending and Stretching | 23c |
| 3. Neck-Rest-Standing Trunk-Turning and Side-Bending | 28B, 27 |
| 4. Standing Arm-Bending and Stretching, upwards, sideways, and forwards | 6, 7, 8 |
| 5. Wing-Standing Trunk-Bending, forwards and backwards | 26 |
| 6. Half-Lying Leg-Bending and Stretching | 22 |
| 7. Standing Head-Circling and Head-Turning | 39, 38A |
| 8. Standing Alternate Toe- and Heel-Raising | 18A, B |
| 9. Stretch-Stride-Standing Trunk-Bending, forwards and backwards | 33 |
| 10. Standing Arm-Raising | 1 |

PREScription IV.

- | | |
|---|--------|
| 1. Standing Arm-Raising | 1 |
| 2. Standing Alternate Toe- and Heel-Raising | 18A, B |
| 3. Cross-Stride-Standing Jerk-Turning | 34 |
| 4. Wing-Standing Alternate Knee-Lifting | 25 |
| 5. Stretch-Standing Side-Bending | 27A |
| 6. Standing Shoulder-Circling | 4 |

* The figures in this column refer to the descriptions of the Movements given in Chapter III.

7. Wing-Hook-Standing Knee-Stretching . . . See No. 24A*
8. Standing Head-Bending, forwards, backwards, and
sideways, alternately with Head-Circling . . . 36, 37, 39
9. Standing Arm-Bending and Stretching, upwards,
sideways, forwards, and backwards . . . 6, 7, 8, 9
10. Stretch-Stride-Standing Trunk-Bending, forwards
and backwards 33

PRESCRIPTION V.

1. Standing Arm-Raising 1
2. Standing Alternate Toe- and Heel-Raising . . . 13A, B
3. Standing Shoulder-Circling 4
4. Standing Arm-Thrusting, forwards upwards . . . 3
5. Wing-Stride-Standing Trunk-Circling 29
6. Wing-Standing Leg-Circling 24D
7. Standing Head-Bending, forwards, backwards, side-
ways, Head-Turning and Circling . . . 36—39
8. Standing Arm-Raising, sideways upwards, with
Arm-Rotation and Hand and Finger-Bending . 1, 11, 12
9. Wing-Standing Trunk-Bending, forwards and back-
wards 26
10. Cross-Standing Knee-Bending and Stretching . . . 23B
11. Neck-Rest-Standing Trunk-Turning 28B
12. Standing Arm-Bending and Stretching, upwards,
sideways, forwards, and backwards . . . 6, 7, 8, 9
13. Stretch-Standing Side-Bending 27A
14. Stretch-Stride-Standing Trunk-Bending, forwards
and backwards 33

PRESCRIPTION VI.

1. Standing Arm-Thrusting, forwards upwards . . . 3
2. Stretch-Standing Side-Bending 27A
3. Wing-Standing Alternate Knee-Lifting 25
4. Neck-Rest-Standing Trunk-Turning 28B
5. Standing Head-Bending, Turning, and Circling . . 36—39

* The figures in this column refer to the descriptions of the Movements given in Chapter III.

- | | |
|--|----------------|
| 6. Standing Arm-Bending and Stretching, simultaneously in different directions | Nos. 9A, B, C* |
| 7. Wing-Standing Trunk-Bending, forwards and backwards | 26 |
| 8. Pass-Positions, with Foot- and Arm-Changing | 40 |
| 9. Standing Arm-Circling | 2 |

The above prescriptions are progressive, so as to be serviceable for different conditions of health and strength. Weak persons should begin with the first prescription, and during the first days perform the movements in a gentle manner, and repeat each of them only a few times; then they should gradually increase the frequency and energy in the performance as they feel their strength increase. By degrees, as health and strength increase, they should take up the next prescription, and so on.

After having gained some practice and experience in gymnastics, the performer can try and put together other movements than those given in these prescriptions, chosen out of the descriptions in Chapter III.

There should, however, not be too frequent changes, for, as long as a person feels benefited by performing the movements belonging to a certain prescription, he should go on with this one, till he feels that its salutary influence becomes diminished—then it is time to make a change.

Movements for growing young people who do not suffer from any organic disease.

That appropriate muscular exercise is necessary for

* The figures in this column refer to the descriptions of the Movements given in Chapter III.

the healthy development of young people is a fact that now is generally recognized by those who have an insight into the laws of human development. The free play is the vital element of youth, but it does not render systematically arranged exercises superfluous in education. For it is only through these that the educator can ascertain that *all-sided* and harmonious development of the organs which should be the basis for all sound education. Rational exercises give a stimulus to the unfolding process of the organism itself, and essentially contribute to counteract the tendency to disturbances of the bodily balance, caused by the exigencies and constraints of civilized life, especially school-life.

Unfortunately, schools have not, as yet, satisfactorily solved the problem of giving an appropriate share of physical education to their pupils. Even where *something* is done in the right direction, it is generally not quite sufficient for the purpose, as the time afforded seldom exceeds a few half-hours of exercises in a week;* it is, therefore, but right that the home should supply the want.

The following prescriptions are meant for home use. One of the distinguishing features of the Swedish system of rational gymnastics is, that it has recourse to the resources of the human organism itself, and consequently is as much as possible independent of external objects. However, it is by no means averse to certain gymnastic appliances if judiciously employed. I would, for

* How many schools are there in England, especially for girls, where systematic physical education is entirely neglected !

instance, recommend that there should be in every house two thick vertically hanging ropes firmly fixed to the ceiling or a door-lintel, at two feet distance from each other, for all the members of the family to perform daily a hanging or trunk-lifting exercise. The hands grasp the ropes at equal height above the head, and support, for a short moment, the whole weight of the body, either by simply hanging with straight arms, or—if the person be sufficiently strong—by slowly bending the elbows, thus lifting the body. This trunk-lifting should be repeated 3—6 times, and, when the body is lowered in the intervals between, this should be done slowly, with the toes always touching the ground before the heels, to avoid any nervous commotion. There ought also to be in each house a few appropriate implements for children and young people to perform some simple manual work. This would afford them an occupation, both useful and pleasant, in their leisure hours.

PRESCRIPTION I.

1. Standing Arm-Raising	See No. 1*
2. Cross-Standing Knee-Bending and Stretching	23C
3. Wing-Forward-Lying Trunk-Holding	30
4. Standing Arm-Bending and Stretching, upwards and sideways	6, 7
5. Wing-Backward-Lying Trunk-Raising	31
6. Standing Alternate Toe- and Heel-Raising	18A, B
7. Neck-Rest-Standing Trunk-Turning	28B
8. Wing-Standing Alternate Knee-Lifting	25

* The figures in this column refer to the descriptions of the Movements given in Chapter III.

9. Wing-Standing Trunk-Bending, forwards and backwards See No. 26*
10. Standing Arm-Thrusting, forwards upwards 3

PRESCRIPTION II.

1. Standing Arm-Thrusting, forwards upwards 3
2. Neck-Rest-Standing Alternate Knee-Lifting 25
3. Wing-Forward-Lying Trunk-Holding 30
4. Balance-Standing Leg-Movements 24A, B, C, D
5. Cross-Stride-Standing Jerk-Turning 34
6. Standing Arm-Bending and Stretching, upwards, sideways, forwards, backwards 6, 7, 8, 9
7. Wing-Backward-Lying Trunk-Holding 31
8. Trunk-Lifting 17
9. Standing Head-Bending, forwards and backwards, Head-Turning and Circling 36, 38, 39
10. Neck-Rest-Standing Alternate Toe- and Heel-Raising 18A, B
11. Stretch-Standing Side-Bending 27A
12. Standing Arm-Flinging outwards 10

PRESCRIPTION III.

1. Standing Arm-Thrusting, forwards, upwards 3
2. Cross-Stride-Standing Jerk-Turning 34
3. Wing-Standing Alternate Knee-Lifting 25
4. Neck-Rest-Standing Trunk-Turning 28B
5. Wing-Standing Leg-Circling 24D
6. Standing Head-Circling, Turning, and Bending 39, 38, 36, 37
7. Pass-Positions, with Foot and Arm-Changing 40
8. Stretch-Standing Trunk-Bending, forwards and backwards 33

Movements for Infants.

Systematic movements may be adopted for children at almost any age. The limbs of infants are capable of

* The figures in this column refer to the descriptions of the Movements given in Chapter III.

receiving so-called passive movements — movements given by another person,—and at the age of three or four years the child can have also passive-active (“duplicated”) movements—movements where another person gives resistance or assistance during the movement. The mother, or any other tender and careful person (having previously acquainted herself with the movements) can perform this as well as any of the duties of child-nursing in general.

Some people may perhaps feel inclined to ask whether systematically arranged exercises are necessary to healthy children, who are of themselves inclined to move about as soon as they begin to walk or even to crawl. To be sure it is the happy instinct of nature that drives children (as well as the young of animals) to begin as soon as possible to perform movements, so beneficial to their healthy development, and which take their beginning from their sprawlings in the very first days of their existence. This instinct testifies decidedly to the necessity of bodily exercise even in the very earliest age, and surely it cannot be considered an undue encroachment upon nature to watch over and, in some measure, incite the movements; not more so than it is to guard and educate it in other respects. For it should be borne in mind that there are many things which tend to mislead the instinct in children. And it is not less important that *they* should have all-sided exercise than it is for people of more advanced age. The tender limbs of infants experience as wholesome and pleasant influence from such exercise as those of

maturer persons, supposing, of course, that the movements be well adapted to the strength of the little ones.

Many ailments in children—such as gripes, costiveness, &c.—should be treated with passive movements: frictions of the abdomen, with stretched fingers, and kneading of the abdomen (the bent fingers of both hands pressing the abdomen from each side alternately). Gymnastics is a remedy which should be taken up in every-day life as one of the vital conditions for health.

PRESCRIPTION I.

1. *Stretch-Standing Arm-Circling* (Passive), 6—10 times.

Standing behind the child, one grasps its hands from the insides, and, having brought its arms in stretch-position (upwards), one makes them gently describe simultaneously a circling motion outwards.

2. *Wing-Forward-Lying Trunk-Holding*. (See No. 30.)

(A child can easily perform this movement on a mattress or an ordinary sofa.)

3. *Stretch-Lying Leg-Separation and Closing*.

The child, lying on its back with the arms stretched above the head, should slowly move its stretched legs one to each side, and as slowly bring them back again close to each other. The assistant, having previously grasped the heels of the child, makes a gentle resistance to these motions.*

4. *Wing-Sitting Spiral-Turning*.

The child is seated erect on a stool, hands on hips.

* Well-proportioned resistance to a motion strengthens and modifies its effects.

The assistant stands in front, grasping its shoulders (one from before, the other from behind), and, slightly pressing with his knees those of the child, so as to keep them in their place during the motion, he moves the trunk of the child in a circle, first to one side, 5—8 times, then to the other as many times.

5. *Stretch-Lying Leg-Bending and Stretching.*

The child lies on its back, with the arms stretched above the head; the assistant grasps its heels, and makes a slight resistance whilst the child bends its legs (drawing them up as much as possible), and again stretches them, and so on, 5—8 times.

6. *Wing-Lying Trunk-Raising*, 4—6 times.

The child, lying on its back, rises slowly to a sitting posture, the assistant meanwhile facilitating the motion by pressing his hands on the knees of the child.

7. *Stretch-Lying Arm-Bending and Stretching.*

The child, lying on its back, with the arms stretched above its head, bends the arms to the sides, and again stretches them 6—8 times. The assistant, having previously grasped the child's hands from the insides, makes a gentle resistance to these motions.

Movements for Elderly Persons.

1. Half-Stretch-Grasp-Standing Arm-Circling	. . .	No. 14*
2. Wing-Stride-Standing Trunk-Circling	. . .	29
3. Sitting Foot-Circling	. . .	19
4. Wing-Standing Trunk-Bending, forwards and backwards	. . .	26
5. Half-Lying Leg-Bending and Stretching	. . .	22

* The figures in this column refer to the descriptions of the Movements given in Chapter III.

6. Standing Shoulder-Circling	No. 4*
7. Neck-Rest-Standing Trunk-Turning	28B
8. Half-Stretch-Grasp-Standing Arm-Circling	14
9. Standing Head - Bending, forwards and back- wards, and Head-Turning	36, 38
10. Standing Arm-Raising	1

It is a satisfactory and not very uncommon thing to see an aged person enjoying bodily and mental health. Old age, however, is the stage of life where, in accordance with the laws of nature, a decrease in strength takes place. But it is one of man's precious duties to do all in his power to conserve his bodily and mental powers as long as possible in full vigour. One of the chief means for attaining this aim is bodily exercise. But the exercises should be stimulating and not fatiguing; they should invigorate the forces, and not exhaust them. Just as old people's food should be nourishing and easy to digest, so should the exercises never go beyond what is appropriate to their forces.

Movements against Congestion to the Head and Head-ache.

PRESCRIPTION I.

1. Standing Arm-Raising	No. 1*
2. Sitting Foot-Circling	19
3. Wing-Stride-Standing Trunk-Circling	29
4. Standing Arm-Raising with Hand- and Finger- Movements	1, 12
5. Neck-Rest-Standing Trunk-Turning	28B
6. Cross-Standing Knee-Bending and Stretching	23c

* The figures in this column refer to the descriptions of the Movements in Chapter III.

72 *Movements against Narrowness of the Chest, Asthma,*

- | | |
|---|---------|
| 7. Half-Stretch-Grasp-Standing Arm-Circling . . . | No. 14* |
| 8. Standing Head - Bending, forwards and back -
wards, and Head-Circling | 36, 39 |
| 9. Wing-Standing Elbow-Moving backwards | 5 |
| 10. Standing Head-Turning and Bending | 38B |
| 11. The same as 1. | |

PREScription II.

- | | |
|---|----------------|
| 1. Half-Stretch-Grasp-Standing Arm - Bending and
Stretching | 15 |
| 2. Wing-Standing Alternate Toe- and Heel-Raising . . . | 18 |
| 3. Wing - Standing Trunk - Bending, forwards and
backwards | 26 |
| 4. Half-Lying Leg-Bending and Stretching | 22 |
| 5. Standing Head-Bending, Turning, and Circling | 36, 37, 38, 39 |
| 6. Cross-Standing Arm-Rotation with Hand- and
Finger-Movements | 11, 12 |
| 7. Cross-Stride-Standing Jerk-Turning | 34 |
| 8. Lying Leg-Circling | 21 |
| 9. Stretch-Standing Side-Bending | 27A |
| 10. Standing Arm-Raising | 1 |

Weak persons should perform the movements with great moderation, and only repeat them a few times. Stronger persons may perform them with more energy, and repeat them much oftener at each practice.

Movements against Narrowness of the Chest, Asthma, Consumption in its early stage.

PREScription I.

- | | |
|---|-------|
| 1. Standing Arm-Thrusting, forwards, upwards . . . | No. 3 |
| 2. Cross-Standing Knee-Bending and Stretching . . . | 23C |
| 3. Neck-Rest-Standing Trunk-Turning | 28B |
| 4. Wing-Standing Elbow-Moving, backwards | 5 |

* The figures in this column refer to the descriptions of the Movements given in Chapter III.

5. Half-Stretch-Grasp-Standing Arm-Bending and Stretching	No. 15*
6. Cross-Stride-Standing Jerk-Turning	34
7. Wing-Standing Alternate Toe- and Heel-Raising	18A
8. Neck-Rest-Standing Side-Bending	27B
9. Standing Arm-Flinging outwards	7
10. Standing Shoulder-Circling	4
11. Standing Arm-Raising	1

PRESCRIPTION II.

1. Wing-Standing Elbow-Moving, backwards	No. 5
2. Standing Arm-Thrusting, forwards upwards	3
3. Neck-Rest-Standing Trunk-Turning	28B
4. Standing Arm-Bending and Stretching, upwards and sideways	6, 7
5. Stretch-Standing Knee-Bending and Stretching	23C
6. Stretch-Standing Side-Bending	27A
7. Pass-Positions	40
8. Front-Lying Trunk-Raising	30
9. Cross-Standing Arm-Flinging outwards	10
10. Wing-Standing Trunk-Bending, forwards and backwards	26
11. Standing Arm-Raising	1

The second prescription is stronger than the first one, and should not be taken up till some practice in gymnastics and increase in strength have been gained through performing for some time the first prescription. Through the widening of the chest and strengthening of the respiratory organs in general that are brought about by these movements, the voice also acquires more power. The above movements, therefore, may be recommended for orators, singers, and stammering people.

* The figures in this column refer to the descriptions of the Movements given in Chapter III.

Movements against uneven and weak Circulation of the Blood, and against Heart diseases in the early stages.

PRESCRIPTION I.

1. Standing Shoulder-Circling	No. 4*
2. Sitting Foot-Circling	19
3. Wing-Stride-Standing Trunk-Circling	29
4. Wing-Standing Alternate Toe- and Heel-Raising	18A
5. Half-Stretch-Grasp-Standing Arm-Circling	14
6. Neck-Rest-Standing Trunk-Turning	28B
7. Standing Arm-Raising	1
8. Wing - Standing Trunk - Bending, forwards and backwards	26
9. Half-Lying Leg-Bending and Stretching	22
10. Left-Stretch-Grasp-Standing Heart-Percussion	**
11. Wing-Standing Elbow-Moving, backwards	5

PRESCRIPTION II.

1. Half-Stretch-Grasp-Standing Arm-Circling	No. 14
2. Wing-Stride Standing Trunk-Circling	29
3. Standing Arm-Raising, sideways upwards, with rotation inwards and outwards	11, 1
4. Cross-Standing Knee-Bending and Stretching	23C
5. Wing-Standing Trunk-Bending, forwards and backwards	26
6. Neck-Rest-Standing Alternate Toe- and Heel-Raising	18B
7. Stretch-Standing Side-Bending	27A

* The figures in this column refer to the descriptions of the Movements given in Chapter III.

** The left arm is stretched above the head, and kept in this position by the hand grasping some suitable support ; the left side of the chest is slightly arched forwards, the right hand performs a tapping round the region of the heart (keeping the upper arm as quiet as possible). This movement has a calming effect on the action of the heart.

8. Half-Lying Leg-Bending and Stretching . . .	No. 22*
9. Standing Head-Turning and Circling . . .	38, 39
10. Standing Arm-Raising	1

Movements tending to relieve the Bowels.

1. Cross-Stride-Standing Jerk-Turning . . .	No. 34
2. Wing-Standing Leg-Stretching, backwards . . .	24C
3. Wing-Backwards-Lying Trunk-Raising . . .	31
4. Wing-Standing Alternate Knee-Lifting . . .	25
5. Wing-Stride-Standing Trunk-Circling and Turning . . .	29
6. Lying Leg-Circling	21
7. Neck-Rest-Standing Trunk-Circling . . .	28B
8. The same as 3.	
9. Wing-Hook-Standing Leg-Stretching, forwards and backwards	24A, C
10. Stretch-Standing Side-Bending	27A
11. Standing Arm-Thrusting, forwards, upwards . . .	3

The above movements, useful against costiveness, have all of them some influence on the organs of digestion, though their influence is by no means limited to these. Persons in very different states of strength can perform these movements; but those in a weak state should, of course, perform them with less energy and frequency. In either case it would be advantageous to perform all or part of the movements in the prescription two or three times in the day. The here-mentioned complaint, like other chronic diseases, wants time for the cure to work out its effects.

Movements against Chronic Diarrhœa.

1. Wing-Stride-Forward-Bend-Sitting Screw-Rotation	No. 35*
2. Sitting Foot-Circling	19

* The figures in this column refer to the descriptions of the Movements given in Chapter III.

3. Wing-Stride-Standing Trunk-Circling	No. 29†
4. Forward-Bend-Sitting Arm-Bending and Stretching*	6
5. The same as 1.	
6. Half-Lying Leg-Bending and Stretching	22
7. Stretch-Stride-Standing Trunk-Bending, forwards and backwards	33
8. Half-Stretch-Grasp-Standing Arm-Circling	14
9. Stretch-Step-Standing Side-Bending†	27A
10. Standing Arm-Raising	1

Movements against Bad Digestion (Dyspepsia), Chronic Gastric Catarrh, Cardialgia (Heart- burn), Colic (Gripes).

These ailments of the digestive organs are generally accompanied by obstruction in the circulation of the blood in the abdominal organs (especially in the portal vein system), and also by general nervous complaints, such as hypochondria (spleen), hysteria, &c. The following prescriptions are therefore calculated to relieve these complaints as well.

PRESCRIPTION I.

1. Standing Arm-Thrusting, forwards, upwards	No. 3†
2. Wing-Standing Trunk-Bending, forwards and back- wards	26
3. Half-Lying Leg-Bending and Stretching	22
4. Wing-Stride-Standing Trunk-Circling	29
5. Wing-Stride-Forward-Bend-Sitting Screw-Rotation	35

* Seated on a chair or sofa, with the trunk bent forwards in the hip-joints (to a slanting position), the bending and stretching of the arms should be performed as in No. 6.

† One foot standing on an elevation two feet high. The Side-Bending is performed to the side where the foot is raised.

‡ The figures in this column refer to the descriptions of the Movements given in Chapter III.

6. Neck-Rest-Standing Alternate Toe- and Heel-Raising	18A*
7. Neck-Rest-Standing Trunk-Turning	28B
8. Standing Arm-Bending and Stretching, upwards, sideways, and forwards	6, 7, 8
9. Stretch-Standing Side-Bending	27A
10. Standing Arm-Raising	1

PREScription II.

1. Half-Stretch-Grasp-Standing Arm-Bending and Stretching	No. 15
2. Cross-Stride-Standing Jerk-Turning	34
3. Wing-Backwards-Lying Trunk-Raising	31
4. Wing-Standing Alternate Knee-Lifting	25
5. Wing-Stride-Standing Trunk-Circling	29
6. Reach-Grasp-Standing Arm-Bending and Stretching	16
7. Stretch-Stride-Standing Trunk-Bending, forwards and backwards	33
8. Wing-Standing Leg-Circling	24D
9. Neck-Rest-Standing Side-Bending	27B
10. Standing Head-Bending and Circling	36, 37, 39
11. Standing Arm-Raising	1

Movements against Hæmorrhoids (Piles).

1. Wing-Standing Trunk-Bending, forwards and back- wards	No. 26
2. Cross-Standing Knee-Bending and Stretching	23B
3. Wing-Stride-Standing Trunk-Circling	29
4. Wing-Standing Knee-Lifting	25
5. Neck-Rest-Standing Trunk-Turning	28B
6. Stretch-Standing Knee-Bending and Stretching	23C
7. Cross-Stride-Standing Jerk-Turning	34
8. Wing-Hook-Standing Leg-Stretching, forwards and sideways	24A, B
9. Neck-Rest-Standing Side-Bending	27B
10. Lying Leg-Circling	21
11. Standing Arm-Bending and Stretching, sideways, forwards, and upwards	7, 8, 6

* The figures in this column refer to the descriptions of the Movements given in Chapter III.

This complaint (which manifests itself by swelling or bleeding of the veins at the lower part of the rectum) is generally of a secondary nature—*i.e.*, depending on disturbances in the abdominal organs, or on diseases in the lungs or the heart; it is therefore necessary, especially in the latter cases, with due regard to the original complaint, to perform the movements with less vigour, and even exclude some of the more straining ones.

Movements against Inguinal Hernia (Rupture).

It is a fact established by experience that appropriate movements can cure inguinal ruptures of recent date, and even those of longer standing, if not of any severer kind. The scientific explanation of this fact is that, by certain movements, the muscles that surround the rupture are strengthened and increased in bulk, so as to contract the passage of the rupture.

A truss is necessary to prevent the falling out of the hernia; but it has no active strengthening influence on the muscles as the movements have; consequently, it does not render these superfluous.

- | | |
|---|-----------|
| 1. Wing-Stride-Forward-Bend-Standing Arm-Raising* | No. 1† |
| 2. Cross-Stride-Standing Jerk-Turning | 34 |
| 3. Balance-Standing Knee-Bending and Stretching | 24A, B, C |
| 4. Wing-Backward-Lying Trunk-Raising | 31 |

* The feet are placed at a distance of two feet from each other; the trunk is slightly bent forwards, with the chest arched. From this starting position the Arm-Raising is performed.

† The figures in this column refer to the descriptions of the Movements given in Chapter III.

5. Stretch-Standing Knee-Bending and Stretching	No. 23B*
6. Neck-Rest-Standing Trunk-Turning	28B
7. Standing Arm-Thrusting, one arm up, the other down	13
8. The same as 4.	
9. Balance-Back-Support-Standing† Leg-Bending and Stretching, forwards	24
10. Stride-Standing Arm-Thrusting, forwards upwards	3

Here may be repeated what is already said in the Introduction—that the prescriptions here given are not meant to render the advice of a physician superfluous, nor to fully supply the place of movements prescribed by an examined practitioner of the Swedish movement-cure. They are rather meant to induce people to seek advice in the first threatenings of a disease, and thus avert it, if possible.

* The figures in this column refer to the descriptions of the Movements given in Chapter III.

† The back rests against a wall (or a door), the left knee is bent up and stretched forwards several times, as described in 24 ; then the right leg performs the same motion as many times, and so on.

SWIMMING AND COLD BATHS.

THE art of swimming and the habit of taking cold baths did not originate from the progress of civilization. Savages have at least as much taste for these things as the inhabitants of civilized countries. Necessity is in general the immediate motive-power of human activity, and, ere man knew how to construct boats and bridges, he was urged by the need of crossing deep waters to try and practise swimming. The inhabitants of the water, no doubt, gave man the first clue to swimming.

With the ancients cold baths and swimming were highly appreciated. Homer describes how the heroes of Greece refreshed themselves in rivers and lakes. Herodotus tells us how the inhabitants of the Greek islands made daring leaps from the rocks into the sea, and distinguished themselves by swimming and diving. The effeminate peoples of the East had a taste for warm baths; and, when luxury and effeminacy had taken up their abode among the Romans, these displayed an intolerable luxuriousness in their warm baths. The so-called Chinese, Turkish, and Roman baths extended in a more or less modified form into the various countries of Europe.

But though these baths were thus propagated, and, in some measure, usurped the place of cold baths and swimming in our part of the world, these were never entirely forgotten, and in our century they have revived with new force. In our time the most astonishing feats in the art of swimming have been performed. Lord Byron swam across the Hellespont; Cliax across the Lake of Geneva ; Webb has carried out the wonderful achievement of swimming across the English Channel. Several others, both men and women, have given the most foolhardy proofs of ability in the art of swimming.

Such instances show to what height the art of swimming may be brought by means of natural disposition, practice, and a happy constitution, but it cannot be attained by the multitude ; besides, a general endeavour to attain this point would be injurious to most people by its excess.

It being our intention to urge a more extensive use of cold baths and swimming, we will not omit at the same time to warn against any misapplication of these things. *When taking a cold bath or swimming exercise, one must never leave the water and again descend into it several times shivering with cold*, as is too frequently the practice with young people when left to their own discretion at swimming establishments and bath-houses. This not only tends to destroy the wholesome effect of the bath, but even to produce consequences endangering health.

The first effect of the cold water is naturally a sensation of chill, but this sensation subsides gradually, or

almost disappears after a short time—in some people in a few seconds, in others in a few minutes—and is then followed by an agreeable sensation of warmth. This is the result of what we call reaction—an increased activity of the organs called forth by the irritation of the water on the skin. The temperature of the water, and the length of time to stay in it, should be suited with a view to obtaining this agreeable and wholesome effect. One should also take into consideration the temperature of the air and individual conditions, such as different stages of development and age, difference of sex, and the state of the health. One is more liable to catch a cold when the air has a low temperature, especially when lower than the water. The colder the water is (within a certain limit) the sooner reaction sets in—in a strong person more easily than in a feeble one. Reaction is more powerful in an adult young person than in children and elderly people; and, as a rule, more so in men than in women. By moving in the water, especially by performing calm swimming motions, reaction sets in both sooner and with more force.

One should never stay in the water so long that shivering sets in and the teeth chatter with cold; these are unmistakable signs that the due limit has been exceeded.

It should be observed as a general rule never to enter into cold water for bathing or swimming till about three hours after a meal, and not immediately after having taken exhausting exercise, or when panting for breath. *It is very objectionable, and even dangerous, to take a cold*

bath when feeling cold; in fact, one should never enter the cold water when the body is below normal temperature.

For swimming, the water ought to have at least 13° Celsius (55·4° Fahrenheit), and even this is such a low temperature that great precaution is necessary.

Swimming exercises are invigorating and hardening, and of great value for the preservation of health when used with moderation; but they call forth such an extensive muscular action, and throw such a great strain on other organs besides the muscles, that their effects, joined to those of the cold water, may tax to the utmost the forces of many persons, even if not indulged in for more than five to ten minutes.

It is beautiful to see the good swimmer's daring and facile leaps into the water; it is quite refreshing to watch his quiet, supple, and accurate motions in the water, as in this way man shows himself the lord of a medium which would otherwise become his grave. But these movements, in order to be useful and beautiful, must be in harmony with the laws of the organism. Swimming exercises, just as any other exercises, if misunderstood and misapplied, may prove both injurious and repulsive.

The guide for acquiring the art of swimming given here below comprises only the most common swimming motions, with some preparatory exercises the practice of which will greatly facilitate the learning.

Man wants a great deal of exercise before being able to swim, as it is not possible for him at once to assume

the right position and make the right movements that will keep him afloat. Among the movements that are natural to him, there does not occur the one forming the base of swimming, namely, to bring his legs together at the same time that he separates his arms from each other, nor is he accustomed to assume the position which facilitates floating with the head above the water. It is, therefore, useful, before trying to swim in the water, to practice some preparatory movements on land, first with the arms, then with the legs, and, finally, with both arms and legs simultaneously.

Forward-Bend-Standing Arm-Swimming.



No. 41.

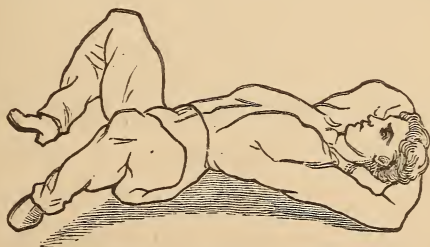
The trunk is bent forwards (see fig. 41) and kept in this attitude during the performance of the arm movements. In order to obtain accuracy in the performance they should be done, to begin with, in three divisions (tempos). Firstly, the arms are bent and raised, so as to bring the upper and fore-arms and the hands in the same level with the shoulders. The hands are slightly bent outwards, their palms facing the ground, though with a slight turning upwards of

the sides of the little fingers, so that these stand higher than the thumbs; the fore-fingers touch each other, and

all the fingers are well stretched and closed to each other. Now the arms are stretched horizontally forwards, without altering the position of the hands to each other, and without pulling the shoulders forwards. Lastly, the arms are moved outwards (the hands in the same position as before) till they come in straight line with each other. From this position the arms are brought the shortest way back to the first-described position, and so on. It is essential that the elbows should be moved in the horizontal plane, the fingers closed up to each other, and that the arms should not be brought too far back. In order to keep good time, it would be advisable to count aloud "one, two, three."

Backward-Lying Leg-Swimming.

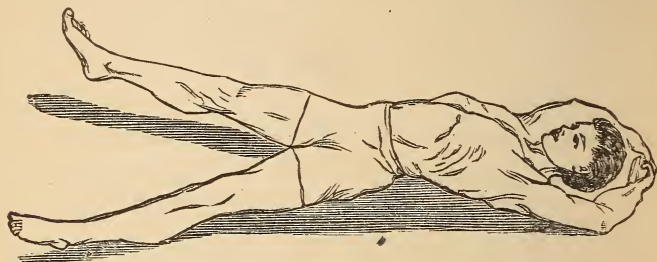
This movement is done lying on the back, as shown in fig. 42. Like the foregoing, this movement is executed in three tempos: in the first, *the knees are bent*



No. 42.

and turned outwards as far as possible, the heels brought close together and drawn up as near the body as possible, the toes bent upwards; in the second tempo, the legs

are suddenly and powerfully stretched outwards (without raising them), the feet being separated at shoulder-breadth's distance from each other (see fig. 43); in the



No. 43.

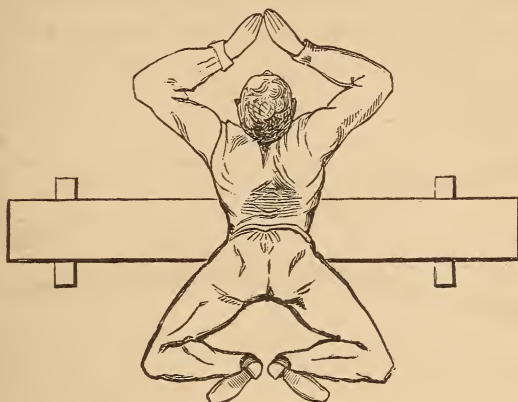
third tempo the stretched legs are brought close together. Then the series of movements begins again with the bending of the knees, and so on.

Note: When the two preceding exercises have been practised for some time with counting three even tempos, then the learner should perform the next one in the same even rhythm. Then, again, practise the arm-movements and leg-movements separately with *uneven* rhythm—that is, perform the first two tempos quickly (counting “one-two”) and the third very slowly (counting “three” slowly). Finally, the combined arm and leg movements (figs. 44 and 45) should be performed in the last-mentioned rhythm.

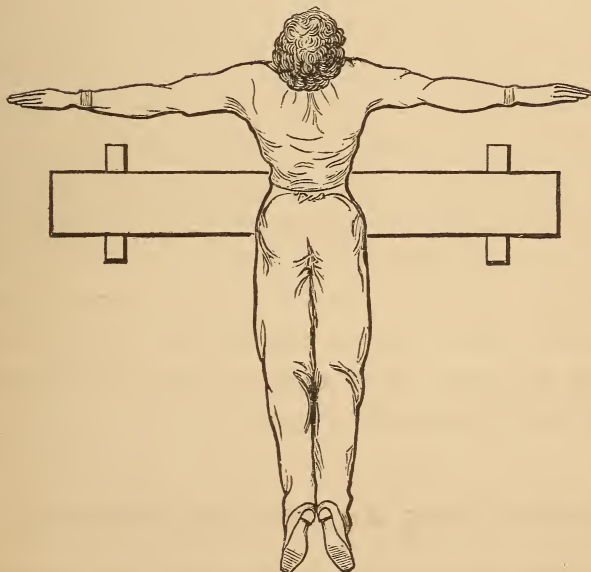
Forward-Lying Arm and Leg-Swimming.

The front of the trunk is supported on a form, a thick mattress, or other elevation, so arranged as to permit the limbs to be moved freely. The whole body is

slightly slanting downwards. The head is raised, the chest arched forwards.



No. 44.



No. 45

Now, the preceding arm and leg-movements are performed simultaneously (figs. 44 and 45) with counting

as already described—first with even rhythm, then with uneven, so that the second tempo follows quickly upon the first. When the student has acquired skill in the simultaneous performance of the arm and leg-movements then he is prepared to begin

Swimming.



Fig. 46.

(a) *Plain Swimming* (see fig. 46).

The first essay at swimming in the water may be facilitated by the use of a swimming-belt, or by somebody giving support under the chin to the swimmer; but most people, if they are well practised in the above preparatory exercises, will be able to acquire easily the art of swimming without any help. At first it should be practised in somewhat shallow water. A good preparatory exercise would be to rest the hands on the

bottom, raise the head above the water, and perform the Leg-Swimming (as in figs. 44 and 45). If, to begin with, one goes a little bit from the shore till the water reaches just below the arm-pits, and then, turning towards the shore, quietly performs the combined arm and leg-movements as before learned, keeping the body in the right inclination, and bending the head backwards (as shown in fig. 46), then a few attempts will be sufficient to keep the body afloat. It is advisable that the beginner continues counting till he has gained some practice in performing the movements steadily in the water. As soon as he can do this, and thereby propel himself forwards, then he has learned the art, and only wants to attain greater skill by practice. Mistakes which retard the attainment of the art of swimming are: Too rapid movements (remember that the third tempo for both arms and legs should be very slow); the endeavour to float on the surface of the water, instead of keeping the body at the above-mentioned inclination; spreading the fingers, instead of keeping them close together; moving the arms too deep in the water, or quite on the surface, instead of about four inches below.

After having acquired some practice and skill in swimming forwards, it is easy to learn swimming on the spot in upright position by means of making small swimming motions with the feet, and keeping the arms horizontally out from the sides, slightly pressing the water with the palms of the hands.

This forms the transition to

(b) Swimming on the Back.

The head is bent backwards, its hinder part immersed in the water; the chest is arched forwards; the legs perform the swimming motions with sharp stretchings downwards. In the beginning one can facilitate the swimming on the back by movements of the arms, or by resting them against the bottom.

After having acquired some skill in this mode of swimming, the arms may be kept either along the sides, or with the hands on the hips, or stretched horizontally to the sides. In the last-named position they may be moved, so as to assist in keeping the body afloat and increase the speed.

Once the art of swimming is acquired, either front-wise or in backward-lying position, there is no great difficulty in passing from one of these positions to the other. By somewhat increasing the speed forwards and stretching forwards the arm on the side that is below when performing the turning, and a general good stretching of the body, the turning from the backward-lying position to the forward-lying one, and *vice versa*, is greatly facilitated.

Leap down into the water ("The Plunge").

In bathing places with shallow water there is no necessity for leaping into the water, but there are many places with high shores where the only possibility of getting a bath is by leaping into it. In cases of accident it is sometimes of the greatest importance to be able to plunge into the water calmly and courageously.

General rules to be observed when leaping into the water are: to take a deep breath before leaping, and to offer the smallest possible surface to the water—that is to say, either the feet or the hands—for if a broader surface, such as the back or the chest, strikes against the surface of the water when leaping from some considerable height, it will cause great pain, and may even have fatal consequences. To begin with, the leaps should be made from only a slight elevation, in order that the learner may gradually accustom himself to self-possession when under the water.

The lap down into the water with feet foremost is performed with stretched legs and feet, the heels closely kept together (so as not to separate when touching the water), the whole body in upright attitude, the arms and the hands stretched and kept close along the sides. When down in the water the swimming movements should be recurred to at once, in order to rise to the surface as promptly as possible.

Stooping-leap down into the water, hands foremost ("The Header").—The body is bent forwards with the arms stretched over the head, the palms of the hands kept close against each other, and when arrived so far forwards that it is on the point of falling, in that very moment one makes a good start with both feet, immediately afterwards throwing upwards the legs and stretching the back. As soon as one touches the water the head and the back should at once be bent backwards in order to change the direction of the body, and thus bring the head above the water. After some

practice the stooping-leap can also be performed head foremost, the arms and hands being stretched close along the sides.

In order to gain assurance and precision a good deal of practice is necessary, and the learner should pass gradually from the easy to the more difficult performances ; thus he should first do the leaping from a lesser height, then from higher and higher places. In the first instance, the inclination of his body towards the water should be less than later on, till it finally becomes a vertical one. He should, however, be careful that in the vertical down-leap the legs may not strike over to the opposite side (*i.e.*, backwards), so as to make him throw a somersault into the water. The more shallow the water, the more the down-leap should approach the horizontal direction. To leap from greater heights demands great force and self-control, and should never be attempted until assurance and practice in taking up the proper attitude have been gained.

When practising the stooping-leaps, it is important to ascertain beforehand the depth of the water and the nature of the bottom, in order to avoid being hurt against stones and other things that may possibly make the water unsafe.

The art of diving consists, properly speaking, in swimming under the water with retained breath and open eyes. Diving is related to the plunge into the water in so far as it can be exercised as a continuation of a stooping-leap by means of swimming under the water either downwards towards the bottom or in the

horizontal direction. This, however, pre-supposes some previous practice in diving into shallow water, and should be done with due precaution and not with rashness.

Diving whilst already swimming can be done in the following manner :—One raises one's self somewhat in the water, stretches the arms over head, making the hands meet, so as to form a wedge in front of the head, then, bending the body and the head strongly downwards, and stretching the legs, one pushes towards the bottom. The first trial in this, as in the foregoing cases, should be made in comparatively shallow water.

Prudence should always be observed when swimming, and this not only by the less skilful swimmer, for even the ablest swimmer cannot go on for an unlimited time. It is very essential to maintain calmness and presence of mind when swimming.

When endeavouring to rescue a drowning person, it is safest to catch hold of him from behind, either by grasping him by his upper-arms or by his hair (if he has got plenty of it); at all events so as to be able to keep his head above the water. If approaching a drowning person in front, it may easily happen that in his terror he clutches his rescuer in such a manner as to render swimming and rescue impossible.

When cramp occurs during swimming, the best thing to do is at once to assume a position that gives as much rest as possible, and press the part where the cramp presents itself. This, in most cases, is sufficient

to drive it away, and for an expert swimmer it is easy to keep himself afloat, even if not moving all his limbs. No one ought to venture swimming far from the shore unless he be an expert swimmer, and even to such a one, if he frequently experiences cramp when fatigued, or exerting himself in swimming, it ought to be a warning not to rely too implicitly on his skill.

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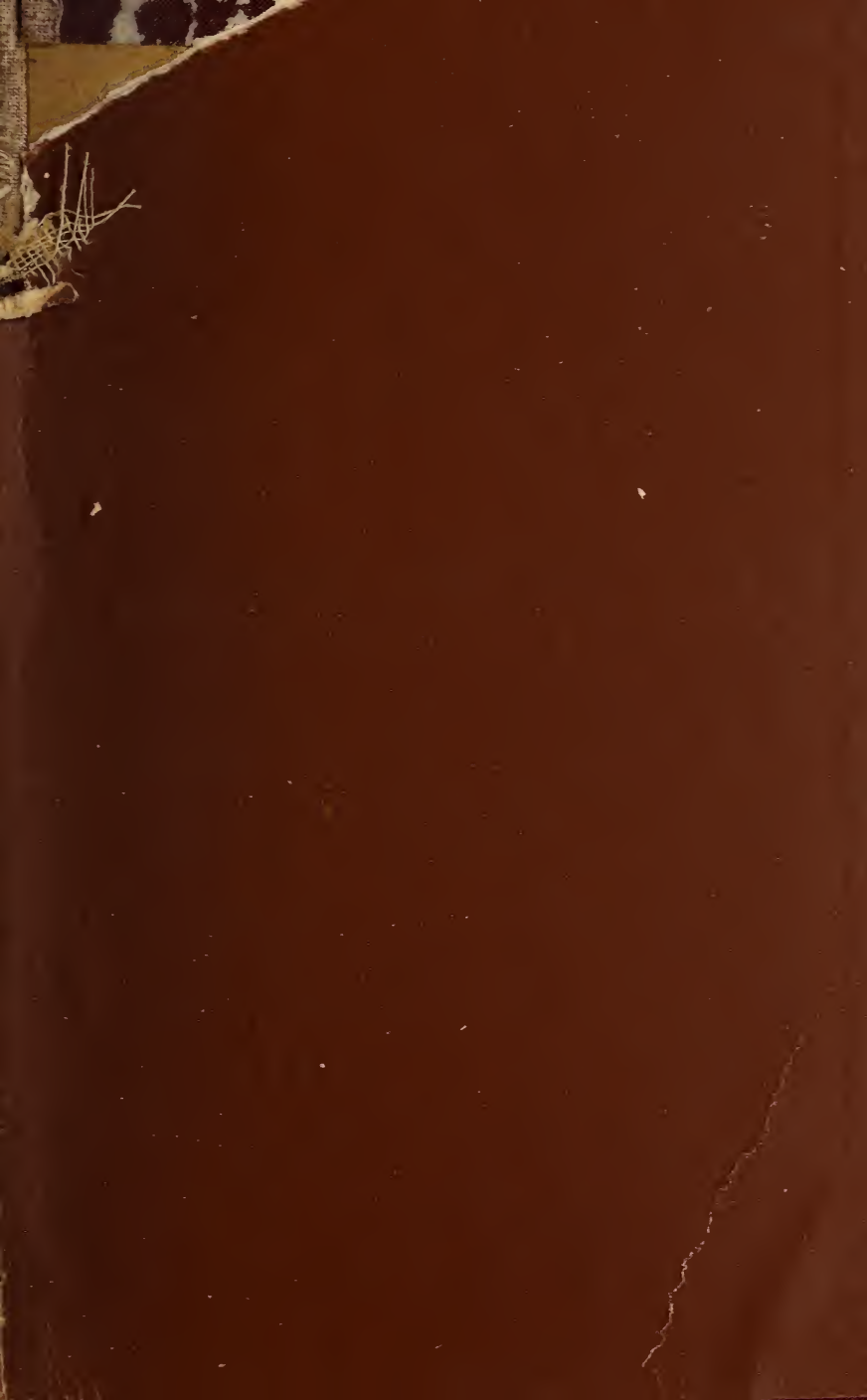
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